June 29, 1929 *A McGraw-Hill Publication* 20 Cents per Copy

AVIATION

The Oldest American Aeronautical Magazine

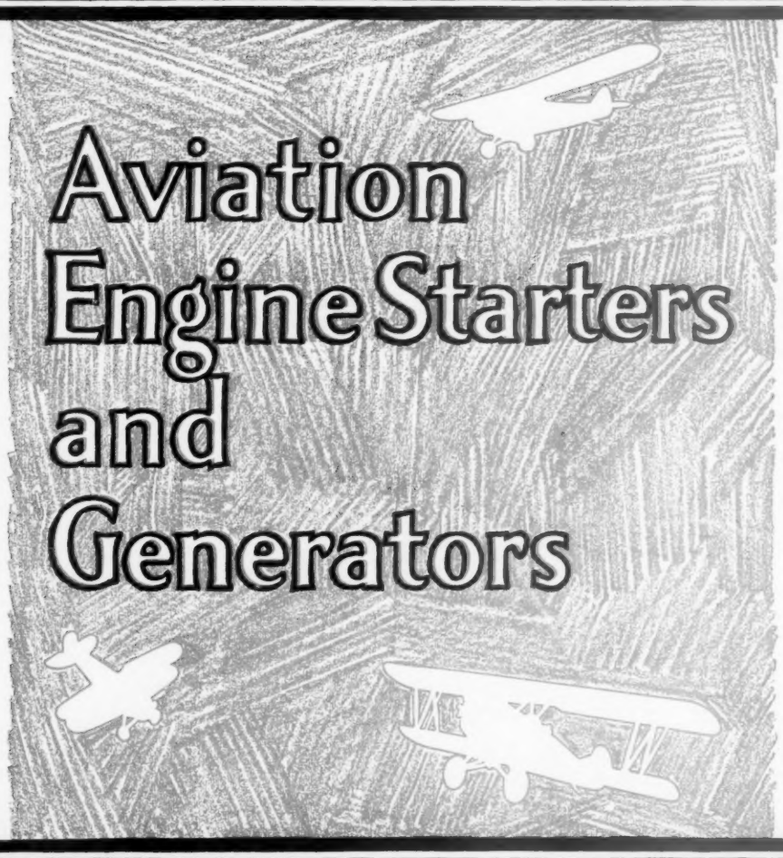
TACOMA PUBLIC LIBRARY

THE *Operation* OF WESTERN CANADA AIRWAYS, LTD.

THE PROBLEM OF *Engine Fuel* REQUIREMENTS

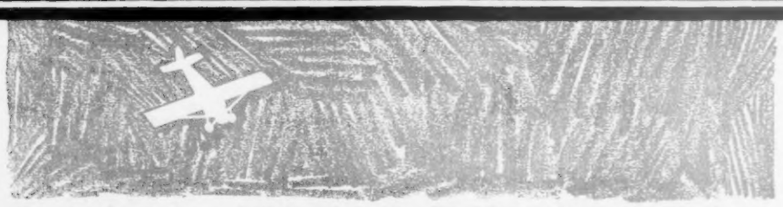
***Increased* PRODUCTION WITH *Decreased* PERSONNEL**

ECLIPSE



ECLIPSE MACHINE COMPANY, East Orange Plant
EAST ORANGE, N. J.

ELMIRA, N.Y. **WALKERVILLE, ONT.**



AVIATION, June 29, 1929. Vol. No. 26, No. 26. Published weekly. McGraw-Hill Publishing Company, Inc., New York, N. Y. Domestic $4.00 per year; Canada $5.00. All other countries $6.00; 20 cents a copy. Entered as second-class matter, July 27, 1928, at the post office at New York, N. Y., under the act of March 3, 1879.

The
HESS-WARRIOR
AIRCRAFT ENGINE
and the
ARGO
AIRPLANE
Built Together — Works Together
IN color—in music—in anything—perfect harmony is that undefined something which is ever satisfying to the human mind.
Perfect harmony in aircraft is not a new idea but a rare one. The unbroken staccato of engine —the perfect performance of plane is exemplified in the Argo—the ship with the related engine.
Built together, the Hess-Warrior powered Argo performs in perfect harmony. Its take-off is smooth—it climbs like a frightened bird—and, it cruises like a gull far out at sea.
Fly the Argo if you would enjoy the utmost in co-ordinate flying.
The ALLIANCE AIRCRAFT CORPORATION, Alliance, O.

The Two Greatest Short-Cuts In Modern Commerce!
C-B147
MONOPLANES CESSNA
PANAMA CANAL
MONOPLANES CESSNA meet the present day demand for quicker, more ECONOMICAL transportation—just as the Panama Canal proved the greatest commercial time and money saver fifteen years ago.
The superior Speed of Monoplanes Cessna is unquestioned. Speed—without sacrificing Strength, Safety, Beauty or Comfort. The ultimate in aircraft for commercial or personal use.
MONOPLANES CESSNA prove the Economy of air travel. Not once—but nearly every week, Cessnas are delivered from Wichita to New York at an average expense of less than 2½c per mile.
Investigate the facts. Realize the full possibilities of today's greatest commercial short-cut. Let us send you the actual facts and figures showing MONOPLANES CESSNA the logical answer to the present day demand. Faster and More Economical Transportation.
CESSNA
"A MASTER'S EXPRESSION"
Curtiss

Manufactured by The Cessna Aircraft Co., Wichita, U. S. A.

CURTISS FLYING SERVICE, INC.

Sole Sales Agents for United States and Canada

NEW YORK OFFICE. 27 W. 57TH ST.. NEW YORK. N. Y.

Designers of aircraft motors think not alone of safety—but of safety-plus.

For of course the factor of safety in all parts used must be many times that which would ordinarily be considered as "safe."

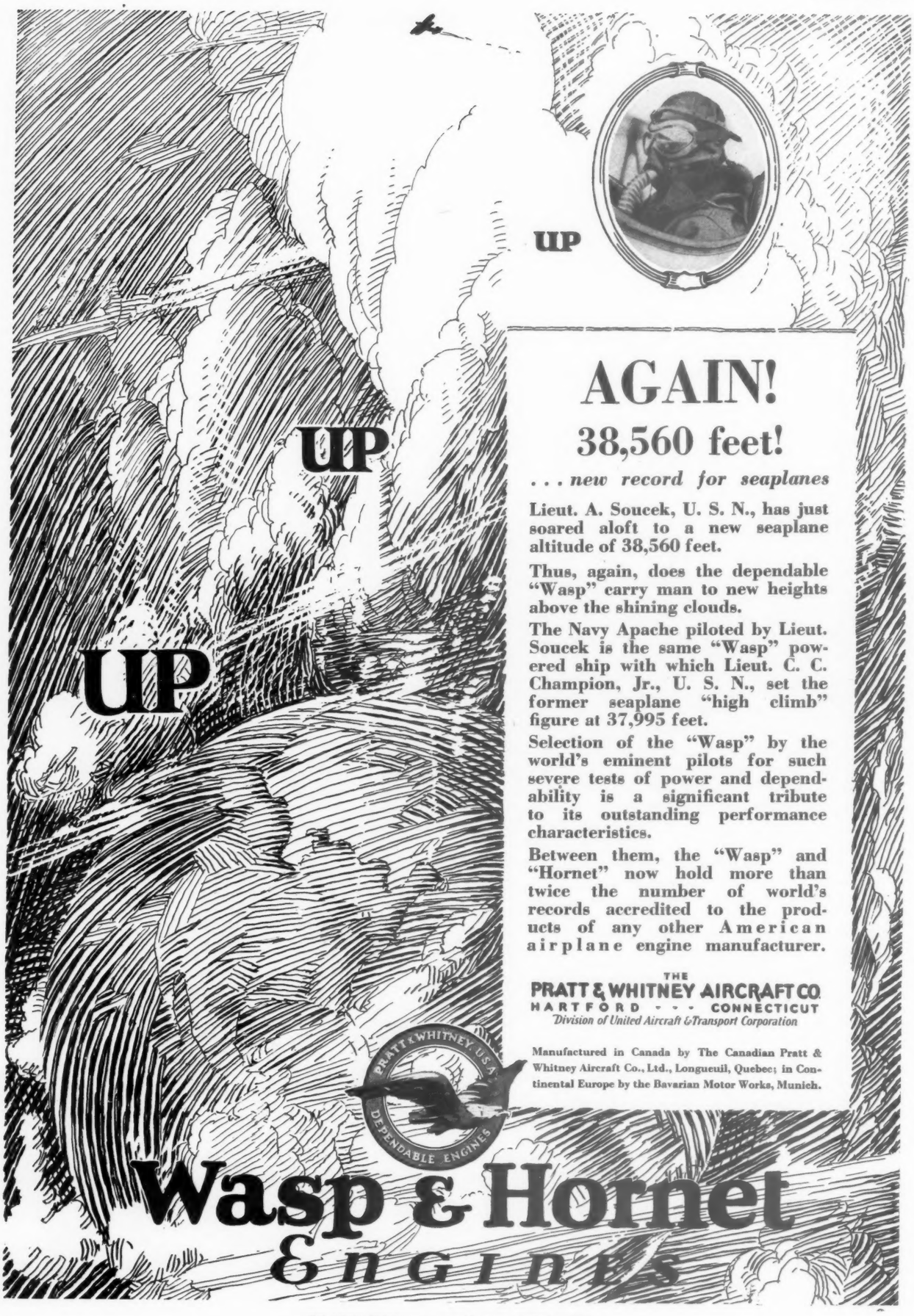
The fact therefore that every standard American aircraft engine is equipped with Bohn Ring True Bearings is ample proof that Bohn Bearings have stood up under every possible test as having a factor of safety-plus.

Aircraft Division

BOHN ALUMINUM & BRASS CORPORATION
DETROIT, MICHIGAN

New York · Chicago · Philadelphia · Cleveland · Pittsburgh

THANK YOU *for mentioning* AVIATION


UP
UP
UP
AGAIN!
38,560 feet!
. . . new record for seaplanes
Lieut. A. Soucek, U. S. N., has just soared aloft to a new seaplane altitude of 38,560 feet.
Thus, again, does the dependable "Wasp" carry man to new heights above the shining clouds.
The Navy Apache piloted by Lieut. Soucek is the same "Wasp" powered ship with which Lieut. C. C. Champion, Jr., U. S. N., set the former seaplane "high climb" figure at 37,995 feet.
Selection of the "Wasp" by the world's eminent pilots for such severe tests of power and dependability is a significant tribute to its outstanding performance characteristics.
Between them, the "Wasp" and "Hornet" now hold more than twice the number of world's records accredited to the products of any other American airplane engine manufacturer.
THE
PRATT & WHITNEY AIRCRAFT CO.
HARTFORD - - - CONNECTICUT
Division of United Aircraft & Transport Corporation
Manufactured in Canada by The Canadian Pratt & Whitney Aircraft Co., Ltd., Longueuil, Quebec; in Continental Europe by the Bavarian Motor Works, Munich.
PRATT & WHITNEY U.S.A.
DEPENDABLE ENGINES
Wasp & Hornet
ENGINES

another airport finds Socony best after a year's test

OLD COLONY AIRWAYS CORPORATION has used Socony Aviation Gasoline in its four planes at Muller Field, Revere, Mass., since the field was opened a year ago. ¶ L. Ponton de Arce, well-known ace and operations manager at Muller Field, always uses Socony Aviation Gasoline when flying in New York and New England. ¶ You, too, will find Socony dependable and readily available throughout New York and New England. Look for the familiar red, white and blue Socony sign.

SOCONY
REG. U. S. PAT. OFF.
Aviation Gasoline ~ Aircraft Oils

STANDARD OIL COMPANY OF NEW YORK

"HEADQUARTERS FOR EVERYTHING IN AVIATION"

DEALER TALKS
No. 2

DEALER: "That's the beauty of this Curtiss Flying Service organization—no matter what you need in the way of aircraft Curtiss can supply it."

PROSPECT: "A plane for every purpose, eh?"

DEALER: "Exactly—now that you're going to be operating in the Wisconsin lake region, this Ireland amphibion just fits your requirements."

PROSPECT: "I've heard that Curtiss is going to operate a nation-wide system of service stations—is that true?"

DEALER: "Yes—and it's a mighty important step. It means that you can get with your plane the same sort of service you have come to expect with your automobile."

PROSPECT: "Sounds good to me. I'd like to fly that Ireland if you could arrange it."

DEALER: "Certainly. There's Captain Ervin now, he's our New England manager. I'll introduce you and we can arrange a demonstration immediately."

PROSPECT: "Fine! You fellows certainly work in close harmony."

DEALER: "You bet we do; and it means a lot to all of us."

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SALES AND SERVICE

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AGRICULTURAL DUSTING

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SIKORSKY AVIATION CORPORATION
CURTISS AEROPLANE AND MOTOR CO., INCORPORATED

IRELAND AIRCRAFT, INC.
COMMAND-AIRE, INC.

27 West 57th Street, New York City

★ACHIEVEMENT

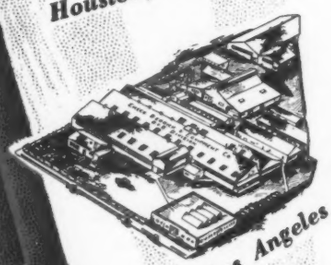
1923 marked the beginning of the EMSCO DERRICK AND EQUIPMENT COMPANY. It is the only organization that manufactures — UNDER ONE MANAGEMENT — a complete line of Oilfield Steel Derricks, Oil Well Drilling Machinery, Deep Well Pumps, Sucker Rods and Production Equipment.

No. 4 — of a series on the history and development of the giant chain of EMSCO organizations.

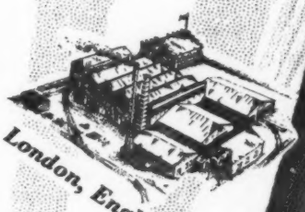
EMSCO AIRCRAFT CORPORATION factory rapidly nearing completion. Arrangements now being made with distributors throughout the world for handling the COMPLETE LINE OF AIRCRAFT TO MEET ALL REQUIREMENTS.

Houston, Texas

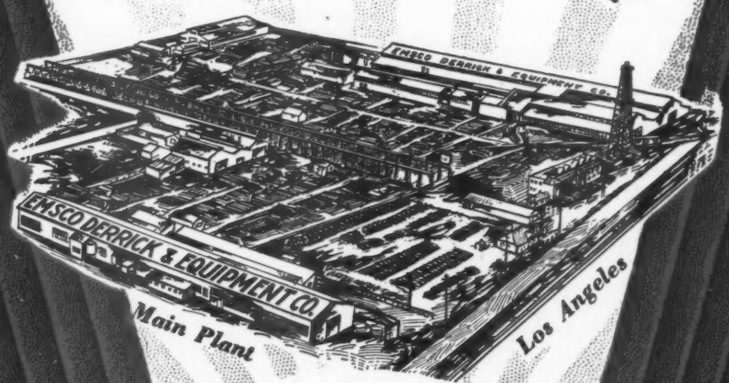
Dallas, Texas



Los Angeles



London, England



Main Plant

Los Angeles

EMSCO AIRCRAFT CORPORATION
DOWNEY, CALIFORNIA

★*ACHIEVEMENT (Noun) A noteworthy and successful action or a distinguished feat. (Heraldry) An escutcheon.*

ROBIN PERFORMANCE

▲ ▲ WHAT THEY SAY ABOUT THE ROBIN

FORT WORTH, TEXAS

"Just a note to tell you how delighted we are with our Robin. I came through St. Louis via Muskogee, Oklahoma, Dallas and into Fort Worth in seven hours and twenty minutes, with a head wind the last two hundred and fifty miles. My average speed for this trip was right around ninety-five miles an hour.

I believe the Robin trims up and flies hands off better and with less attention than any airplane I have ever flown. If anybody wants to know about the Robin 'ASK US.' "

(Name on request)

EASE OF CONTROL AND INSTRUCTION

The Robin manoeuvres easily. Its operation is part of student instruction at any Curtiss Flying School. In the quiet closed cabin conversation can be carried on in a normal tone making instruction doubly effective.

▲ ▲ WHY THEY SAY IT

Superior engineering design alone is responsible for the unmatched Robin performance—the same staff of engineers, that has made Curtiss military planes famous for 19 years, designed the Robin *for you.*

"—WORLD'S OLDEST FLYING ORGANIZATION"

CURTISS FLYING SERVICE

Sole Sales Agents for CURTISS-ROBERTSON AIRPLANE MFG. CO.

CURTISS AEROPLANE AND MOTOR CO., INCORPORATED
CESSNA AIRCRAFT CO. IRELAND AIRCRAFT, INC. SIKORSKY AVIATION CORPORATION
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27 WEST 57th STREET, NEW YORK CITY

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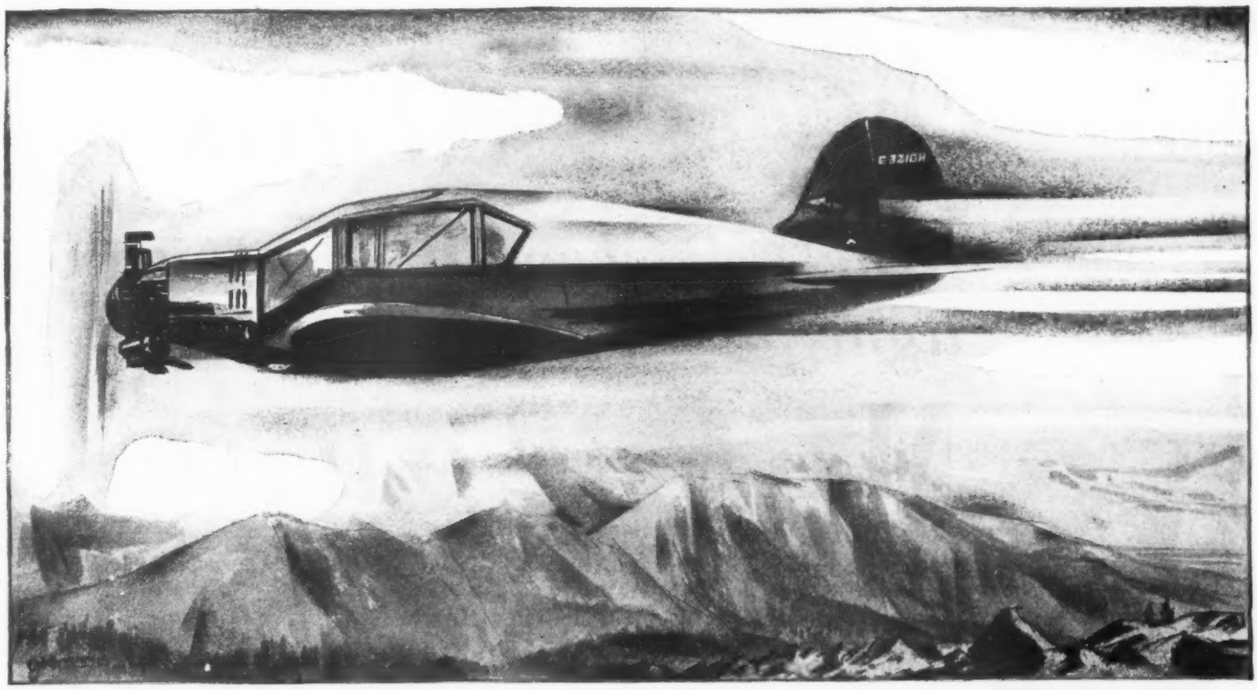
A BULLET WHIZZES THROUGH THE AIR



AND LANDS SAFELY ON

Up over Pike's Peak at the rate of 111 miles per hour went four people *and* a dog, *with baggage for all five, in this new Eaglerock Bullet plane . . . to a safe landing, of course . . . on Goodrich Silvertown tires.*

Goodrich Silvertown Tires

"SAFETY, SPEED AND COMFORT—these are the features flying America wants today," says Don Alexander, President of the Alexander Aircraft Co., Denver, Colo., makers of the revolutionary new Eaglerock *Bullet* monoplane.

And these are the features that are built into Goodrich Airplane tires chosen by Bullet Manufacturers as standard equipment on both their monoplanes and biplanes.

The "split second" Silvertown tire is light of weight, but strong of construction. Such famous pilots as Lindbergh, Chamberlin, Goebel, Brock and Schlee, Kingsford-Smith, and Hawkes launched forth and made *new* records on Goodrich "split second" Silvertowns.

Is it any wonder then that manufacturers turn to Silvertowns as initial equipment in launching their *own* new planes?

Over 45% of the aircraft exhibited at the second All American Aircraft Show at Detroit, April 6th to 14th, *were demonstrated on Goodrich Silvertown Airplane Tires!*

The B. F. Goodrich Rubber Co., Established 1870, Akron, Ohio. Pacific Goodrich Rubber Co., Los Angeles, Calif. In Canada: Canadian Goodrich Co., Kitchener, Ontario.

Three Goodrich Silvertown Airplane tires. Tail-Wheel. Smooth tread. Non-skid.

WING TO WING WITH AVIATION

Goodrich has staked out its field in aviation. The realm of the heavier-than-air craft is its zone of endeavor. There Goodrich has pioneered . . . there Goodrich has helped write airplane history. And there Goodrich flies with the leaders.

Goodrich *Rubber for Airplanes*

Know these

Monocoupe Facts

Ninety Percent of American light planes in 1928 were—

Monocoupes

More Monocoupes sold during first year of production than any other commercial plane in history of the industry. Service Stations in over a hundred airports.

Out of the large number of Monocoupes in service in 1928, the majority in hands of amateurs, there were fewer fatal accidents than sustained by the few well known multi-motored planes in service which were piloted by men of long experience.

Monocoupes have never failed to win prize money in any race meet although they were always matched against motors of approximately twice the horsepower or more.

No commercial airplane is subjected to the vigorous stunting given the Monocoupe. There has never been a structural failure.

It is not only approved by the Department of Commerce but all materials and workmanship viewed by a government inspector on duty at all times.

Instruction time before solo has proven materially less.

A new standard of uniformity and interchangeability of parts. The Monocoupe is one of the very few planes sold with a guarantee that includes the plane and motor as a single unit.

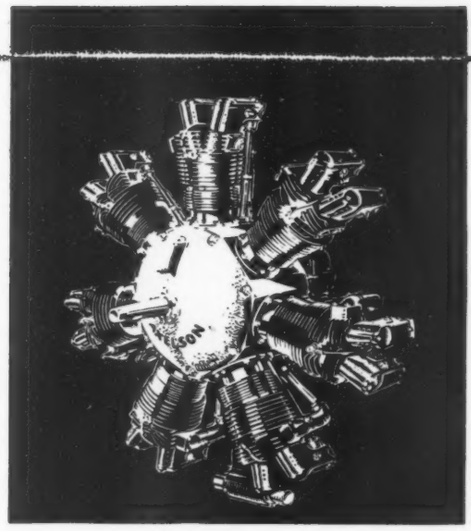
MONO-AIRCRAFT CORPORATION

A Subsidiary of
Allied Aviation Industries
MOLINE, ILLINOIS

The Monocoupe is still the lowest priced approved plane in the world and will continue to give the greatest value for every dollar.

$2675

Flyaway at Moline, Illinois



LEADING

in the field of

150 horsepower

airplane Engines

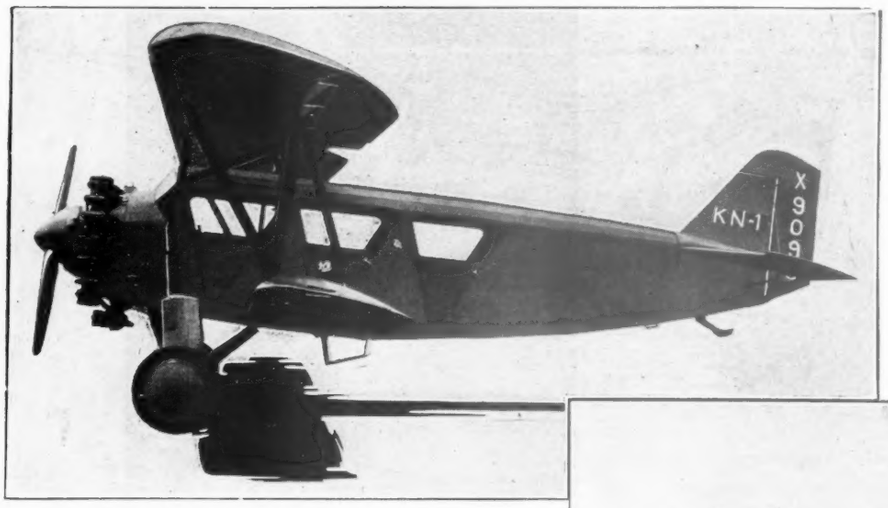
THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

Axelson Machine Company

Factory and General Offices: Corner Randolph St. and Boyle Ave., Los Angeles, California

(P. O. Box 337)

AXELSON AIRPLANE ENGINES

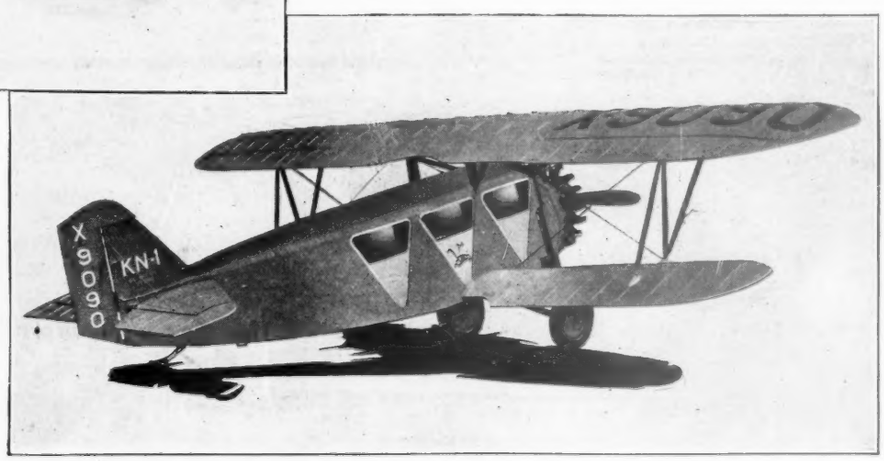


ADEQUATE ENGINEERING

FROM providing a maximum of comfort and convenience for passengers right down to the last little detail of simplifying maintenance and inspection the KN-1 has had the advantage of an engineering staff of established reputation and long experience.

You will be delighted and surprised by many of its unique features—plywood covered wings—the detachable power plant unit—the hundred and one little details that mark it at once as an outstanding design built by an organization that believes in quality and knows how to produce it.

The KNOLL
AIRCRAFT CORPORATION
WICHITA, KANSAS



A6-29Gray

THE FORD PLANE

IS INHERENTLY STABLE

SOME things about a plane you can't put down in figures. Stability is one of them. Specifications on speed, load, climb — none of these indicate stability . . . one of the first things you feel for when you try out a ship.

The Ford tri-motored transport is inherently stable. In rough air it takes care of itself to a great extent. Watch how it holds its bank, once a turn is set, with no tendency to increase or decrease the angle. Yet it responds instantly to any control.

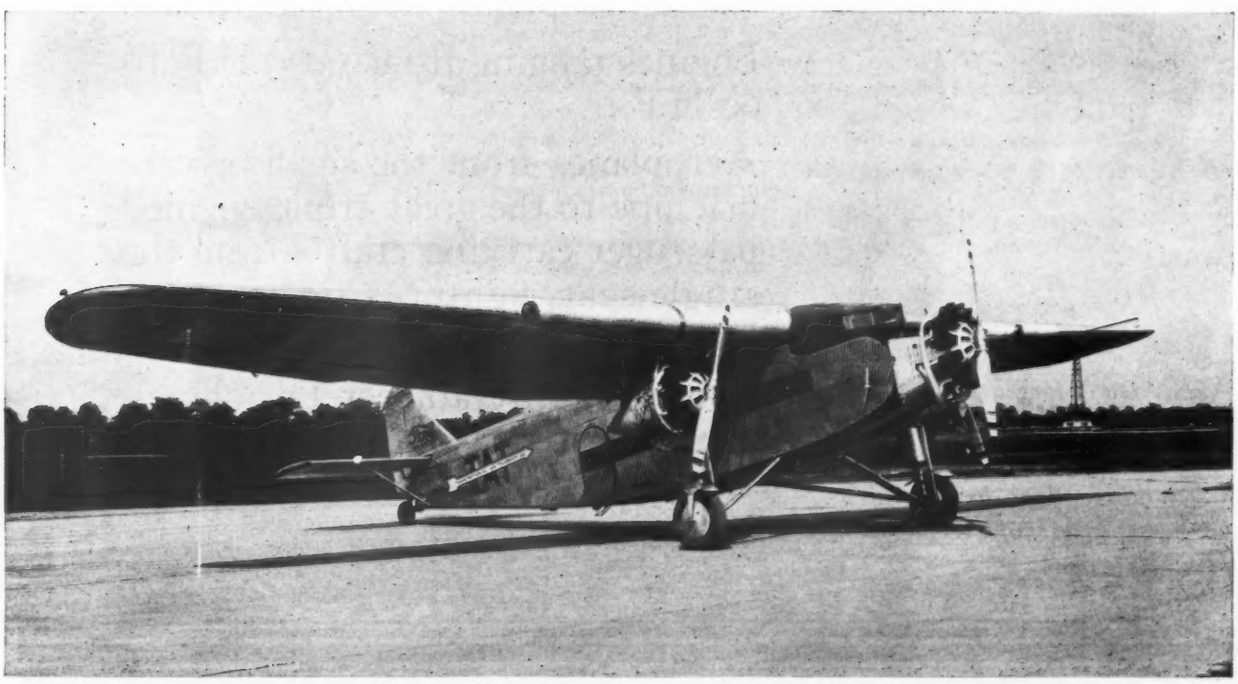
It has sufficient stability to take the fatigue out of a long hop. It relieves the pilot of much of the mechanics of flying and also lets him devote himself to other things where experience and skill count.

But all pilots of Ford planes must be men fully qualified by ability and character to assume responsibility for the property and lives in their charge. Pilots of Ford planes are given flying experience, examined and approved by our operations department before Ford planes, no matter who owns them, can be permitted to go out with them at the controls.

For complete information on any phase of Ford aviation activity, for prices, specifications and details of Ford planes, write direct to The Stout Metal Airplane Company, Division of Ford Motor Company, Dearborn, Michigan.

FORD TRI-MOTOR 5-AT

Span 77 ft. 10 ins. Maximum speed, 140 M. P. H. Maximum radius of action (standard equipped) 5 to 6 hours. Ceiling, 18,000 to 20,000 ft. Weight empty, 7650 lbs. Disposable load, 5600 lbs. Power load, 3 engines, 10.28 lbs. per H. P.; 2 engines, 15.42. Cabin accommodates 13 passengers, pilot and mechanic. Construction: all-metal throughout, exposed surfaces Alclad alloy. Power: 3 Pratt & Whitney Wasps, totaling 1275 H.P. Price, complete with standard equipment including instruments, seats, toilet, etc., flyaway Dearborn, $55,000. (Prices and specifications subject to change without notice.)



One of a fleet of Ford Model 5-AT planes delivered to Transcontinental Air Transport Company

INTERNATIONAL AERO EXHIBITION

July 16-27 1929

OLYMPIA

LONDON, ENGLAND

The greatest and most up-to-date display of aircraft ever assembled under one roof.

Come and inspect at close quarters all the latest aircraft.

A vast array of machines and engines—British, German, etc.,—are on exhibition.

You can view at leisure, land 'planes, seaplanes and flying boats.

Engines ranging from 1,000 H.P. to 60 H.P.

Aeroplanes from the small private machine to the great triple-engined passenger carrying craft—from the single-seat fighter to the giant bombing machine.

Many new aircraft secret machines, just released by the Air Ministry will be displayed for the first time at this exhibition.

Don't forget the R.A.F. Display at Hendon, Saturday, July 13 — three days before the opening of Olympia.

Something new on the map of the world

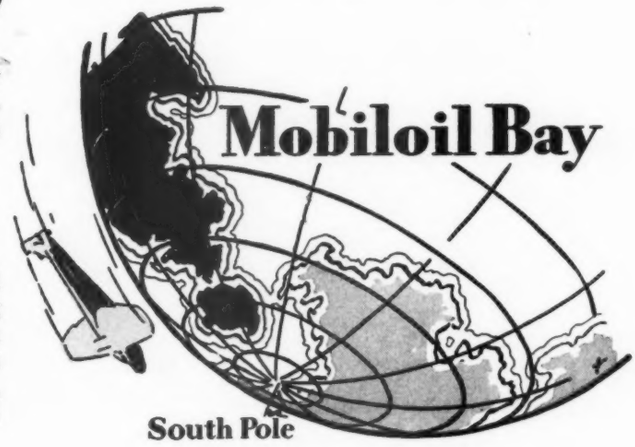
"Mobiloil Bay"

. . . so named by Capt. Wilkins in appreciation of Mobiloil performance in first Antarctic flight ever made.

Shortly after taking off on the first flight ever made over the icy wastes of Antarctica, Capt. Sir Hubert Wilkins made the following entry in his flight diary:

> "Just crossed crest of smooth, splendid indentation on new coast, naming it Mobiloil Bay to commemorate excellent service rendered to aviation and to our expedition by Mobiloil."

Thus another famous pilot pays tribute to the oil which has contributed to the success of daring exploits ever since the very beginning of aviation history. Among other great names associated with Mobiloil performance are: The Wright Brothers, Curtiss, Maughan, Byrd, Goebel, Lindbergh and Earhart.



and something new in aviation

"Double-Range" Mobiloil Aero H

Now, the Mobiloil engineers have perfected a new oil, made especially for aircraft engines—*still better* than the famous stock Mobiloil used in so many famous flights—scientifically improved for the job it has to do.

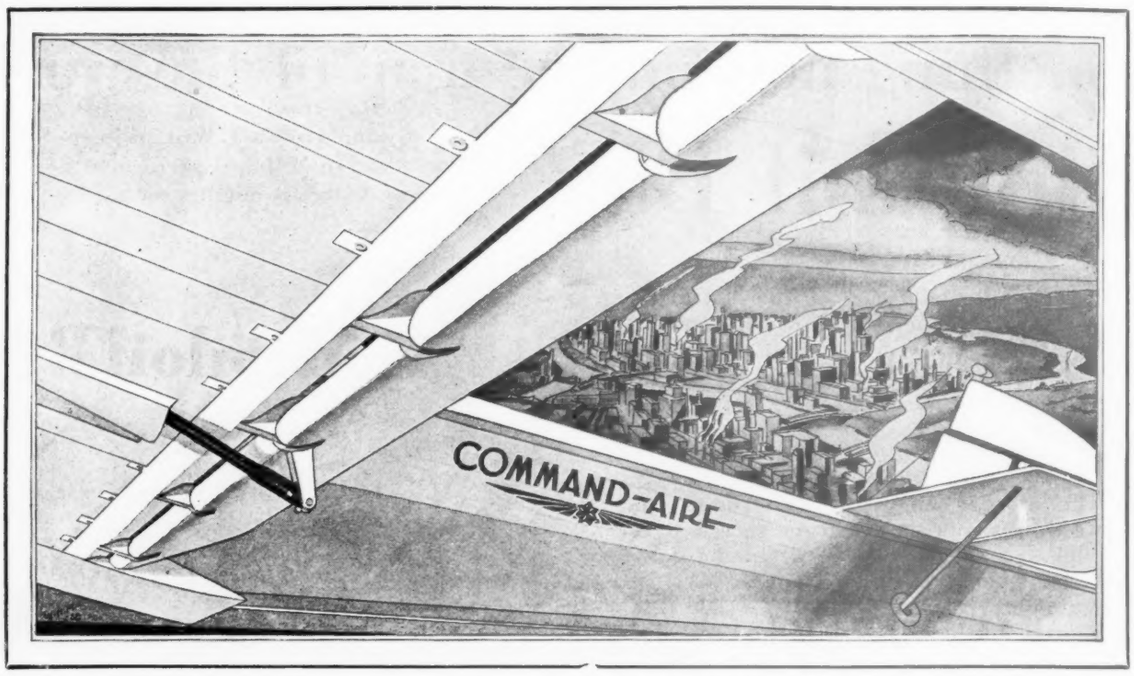
The "double-range" feature of the new Mobiloil Aero H assures body and stamina under severe heat and operating conditions combined with easy starting and exceptional fluidity at low temperatures. Other definite advantages are: Less carbon deposits, freedom from gumming, and an astonishing reduction in oil consumption.

This new "double-range" Mobiloil Aero H is now on sale at, or conveniently near, every airport in the country. Prove its performance in your own engine.

THE VACUUM OIL COMPANY

Makers of high-quality lubricants for all types of machinery

the New GARGOYLE Mobiloil AERO H



Amazing Stability Through Slotted Joining of Ailerons

THIS illustration, reproduced from an actual photograph, gives you an accurate view of Command-Aire's individual aileron-design—a vital factor in achieving the amazing stability of the plane.

Ailerons are attached by slotted joining to the lower wings only, in accordance with the advanced engineering principles embodied throughout Command-Aire's construction, and provide positive control at stall speed either in the air or when landing. This same feature also enables the pilot to make even the steepest banks with very slight movement of the stick.

Striking proof of Command-Aire's incomparable stability is afforded when the pilot leaves the cockpit during the flight and rides the fuselage "bare back", while the plane flies on under perfect self control. This is in no sense a stunt, but merely a practical demonstration that complete control of each Command-Aire plane is assured through correct engineering.

Command-Aire's superiority of design and construction commands the confidence of trained pilots, student fliers, and the business man who now looks to the air for transportation.

For complete information, write any of the distributors below, or direct to COMMAND-AIRE, Inc., Little Rock, Ark.

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802 South Delaware Street

SPRINGFIELD, MASS.
Eastern States Aircraft Corp.
134 Dwight Street

NEW YORK CITY
Eastern Aeronautical Corp.
Graybar Building

CHICAGO, ILLINOIS
Aviation Service & Transport Co.
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WASHINGTON, D. C.
Congressional Airport, Inc.
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COMMAND-AIRE

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27 W. 57th St., New York City, who handle Command-Aire at their 15 airports and in co-operation with the Distributors shown.

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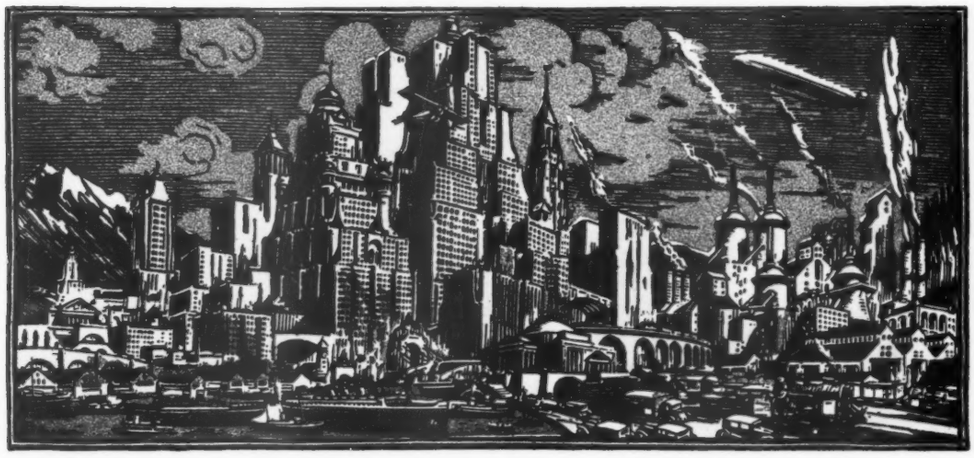
Command-Aire Sales Corp.

TO MEET THE NEW TEMPO OF MODERN BUSINESS



THE McGRAW-HILL PUBLISHING COMPANY

ANNOUNCES THAT

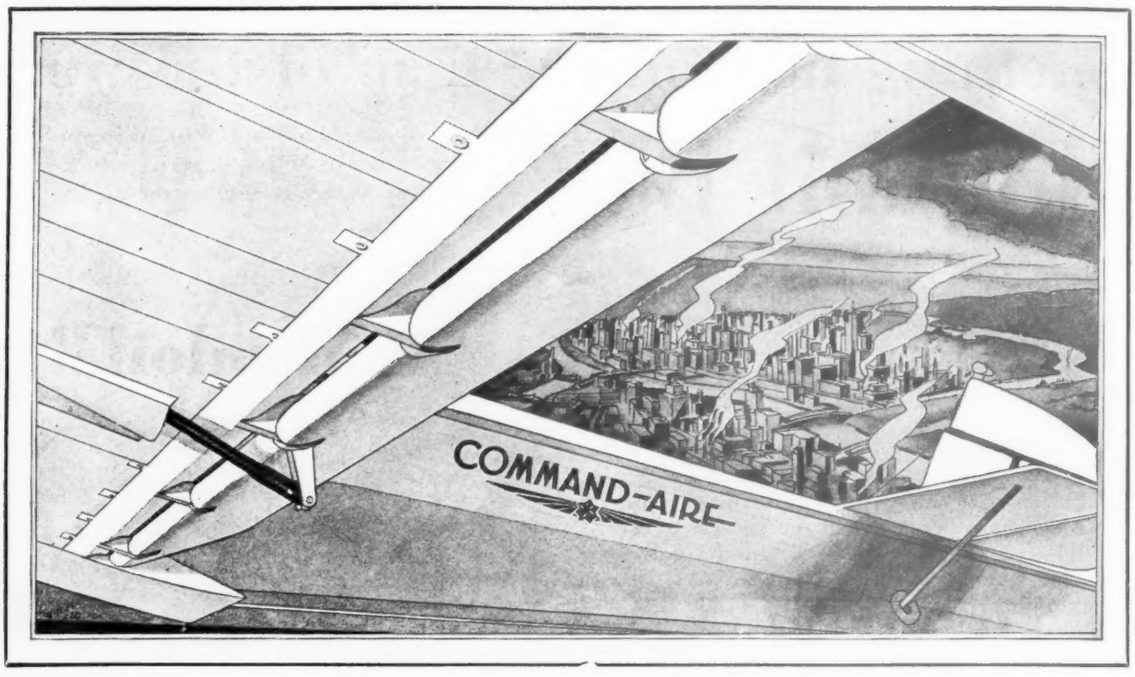
THE MAGAZINE OF BUSINESS

WILL HEREAFTER BE PUBLISHED WEEKLY
UNDER THE TITLE OF

THE BUSINESS WEEK

A Journal of Business News and Interpretation

BEGINNING WITH THE ISSUE OF
SEPTEMBER 7TH, 1929



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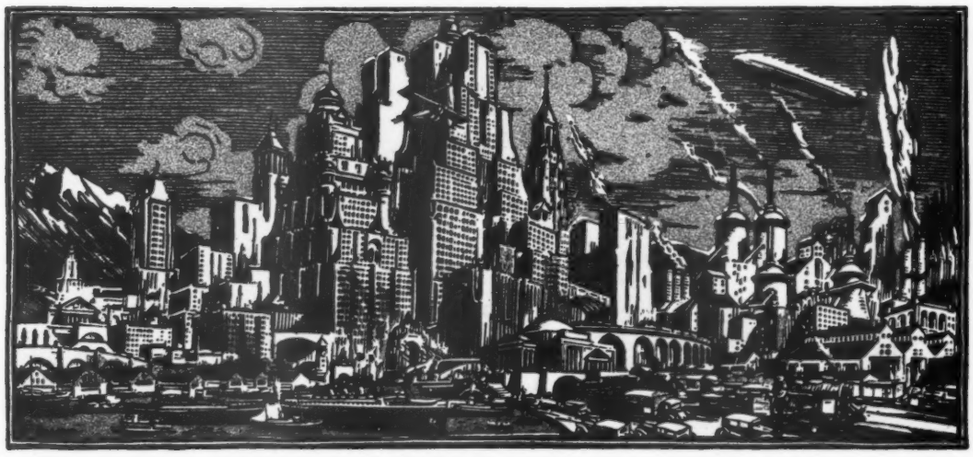
TO MEET THE NEW TEMPO OF MODERN BUSINESS



THE McGRAW-HILL PUBLISHING COMPANY

ANNOUNCES THAT

THE MAGAZINE OF BUSINESS

WILL HEREAFTER BE PUBLISHED WEEKLY
UNDER THE TITLE OF

THE BUSINESS WEEK

A Journal of Business News and Interpretation

BEGINNING WITH THE ISSUE OF

SEPTEMBER 7TH, 1929

THE BUSINESS WEEK

A Journal of Business News and Interpretation

"ACCELERATION, *rather than structural change, is the key to an understanding of our recent economic developments. Gradually the fact emerges . . . that the distinctive character of the years from 1922 to 1929 owes less to fundamental change than to intensive activity . . . Changes have not been in structure but in spread and speed.*"

—from the Report of the President's Committee on Recent Economic Changes.

SPREAD and speed!

How fast has grown the pace of business in the brief span of only three business generations!

In the 1870's the business man came down to his office and started the day by calling his employees, as he could call his customers, by name.

Business was *local*. The business man had immediate and firm control of his business operations—of his employees, his materials and his markets. Rare were the outside influences that touched the conduct of his business.

In Washington, there were only the makers of the tariff. His competition was the store across the street, the factory across the river; his markets were stable, steady. Of labor difficulties he had none; his machines were few and simple, and he knew all that were of use. What went on in the next state or in another industry was of no moment. Business enjoyed a self sufficiency that it will never know again.

◆ ◆ ◆

Consider, then, how vast have been the changes in sixty years: Quantity production, bringing new problems in manufacturing and marketing . . . The new importance of color and design . . Mass distribution . . . Chain stores . . . Transportation and communication speeding up the pace of business . . . New conditions of competition . . The new influence of government at Washington and the State Capitals . . . The new financial structure with vast trading on the exchanges and a widespread ownership of vast corporations . . . Most important of all, research . . . creating new industries—the automobile, the movie, rayon—destroying old ones . . . releasing thousands of workmen here . . . finding new tasks for them and for thousands more . . . Everywhere are new forces touching the conduct of business.

So complex have become the ramifications of business that to-day it has come to be the very essential of business management to have—*a knowledge of the news.*

The collapse of the wheat market in Chicago is not a local affair nowadays. It is not even a western matter. It has its repercussions in Wall Street. It has its meaning to the radio industry . . . It may hurt the silk importer . . . help the rayon mill.

A bank failure in Germany means something to-day to the hardware manufacturer in New Britain . . . It may well happen that

it will mean more than the crash of a bank at home.

◆ ◆ ◆

Observe how great has been the development in publishing for the business man—

A knowledge of happenings and developments within his trade, profession or industry has been so essential as to create a group of industrial, engineering and trade papers of paramount importance to the conduct of American business—providing the business man with an accurate knowledge of material supply, engineering and manufacturing methods, marketing conditions, sales methods, store, office and plant management.

Even the daily newspaper has expanded its business news to the point where it devotes entire sections to the daily news of business.

And yet, with the expanding need of business for facts,—for news,—there is still no single publication that provides the business man with a timely, complete and accurate record and interpretation of the news that touches the conduct of business.

The man who reads the daily newspaper, his trade or industry paper, and the business journals is still without that master-key to the news that he so badly needs in the fast-paced tempo of present-day business.

Over a period of years the McGraw-Hill Publishing Company has been observing and analyzing this condition, studying this growing problem of modern business. The first step was the acquisition of The Magazine of Business; the second, a systematic survey of the business man's need for news; the third, an analysis and organization of the sources of news. Now, the final step: The transformation of The Magazine of Business into The Business Week.

The Business Week with its appearance next September, the only business weekly of general interest, is the answer to the new compulsions of *Spread and Speed.*

◆ ◆ ◆

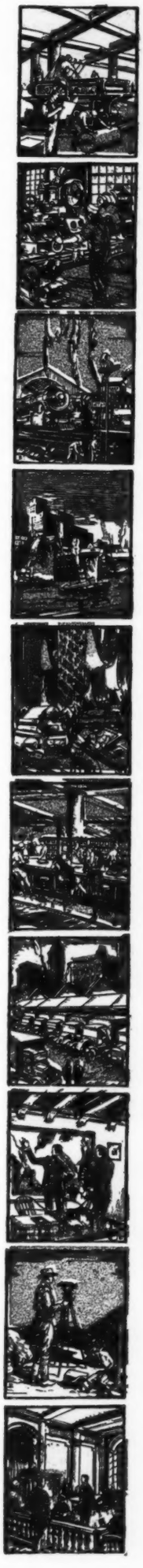
The Business Week will be operated so close to the news that the business world will get the news that counts while it is still hot; but it will be sufficiently *after the event* to enable the editors of The Business Week to clothe the facts with their full significance.

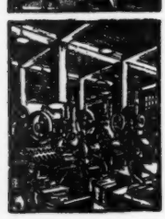
The Business Week will be generously staffed editorially. Trained news gatherers, able and experienced feature writers, economists and statisticians, will so co-ordinate the gathering of the facts and their presentation and interpretation that The Business Week will point straight to the news and its significance—and to the outlook for business.

The result, we are confident, with the co-operation of the McGraw-Hill staff of 128 editors, with the vast editorial resources which 26 McGraw-Hill Publications make available, will be to present to American business a journal of business news and interpretation not available from any other publishing source.

◆ ◆ ◆

The Business Week will be preeminently the business man's journal of business news, vital and vivacious, informative and dynamic, with something American in its every characteristic. It will be keyed to the spirit of the new tempo in American business.





IN CLOSER FOCUS

THE week by week contents of the Business Week will include these features and departments—

The News Interpreted: The introductory section of The Business Week will present the looming features in the news of the week; will discuss and interpret them with authority; with a style that will be alert, crisp, pithy.

It will highlight the outstanding news in a way to point its meaning for the man who must decide the policy of a business institution.

The Business Outlook: Business conditions in all industries and all sections, from the textiles of the North to the canneries of the far West, from the stores of Michigan Avenue to the docks of New Orleans, will be reviewed, checked up, co-ordinated, digested; so that the business man may have at hand each week a timely and brief insight into the trend of business,—may have an answer to his constant but unspoken speculation, "What's next?"

The Week in Washington: What is going on in Washington has much to do to-day with what is done in Detroit and Atlanta. And the National Capital will be thoroughly covered each week by the Washington Editor of The Business Week.

What is Happening in Business: The staff of The Business Week will be in touch with all the fields of business. Significant developments in every department of business—production, sales, management, and all the rest—will be reviewed, clearly and concisely.

Special Articles: Every week there are business developments so freighted with importance to the future of American industry and commerce that they demand special and extended attention. The Business Week will go direct to the fountain head for light on such news. It will present interviews with the great business men of the world who *make* the news. It will offer articles by them on the topics of pressing, immediate interest.

Editorial Leadership: The Business Week, dedicated to the conviction that the great new opportunities of business carry with them corresponding responsibilities upon the business man, will discuss and interpret the conduct of business with vigorous editorials.

It will stand always for the highest ideals of American business—a fair deal for business from government and the public; a fair deal from business for the consumer, the worker and the competitor.

The Business Week will have personality, convictions, a point of view. You may not always agree with its views; you will respect them and find them interesting.

Business in Its Human Phase: Because business is a very humanly interesting thing to business men, the trivial and the oddities, the side-lights and the cross-currents, the ingenious by-plays that make business a warm and fascinating subject—and an altogether human one—will be reflected and reported in The Business Week.

◆ ◆ ◆

In quality and appearance The Business Week will maintain the highest standards.

The size of the magazine will be 8¾ by 11⅞ inches; the size of the type page, 7 by 10⅜ inches. There will be three columns, 429 lines to the page.

The inside pages will be printed on book paper of the finest grade and exceptional weight. The covers will be 110 pound coated of the first grade; printed in color. The binding will be saddle-stitched.

There will be 28 pages—or more—of editorial text; the typography will be characterized by simplicity, spirit and readability. Illustrations will be both photographs and original drawings. There will be original cartoons.

Editorial forms will close Wednesday night. The issue, dated Saturday, will be on the newsstands Friday morning.

Final advertising forms will close on Friday of the week preceding publication—meaning a margin of only one week between the receipt of advertising plates and distribution to the reader.

The Business Week will be priced at 15c the copy; by subscription $5 the year.

The advertising rate will be $600 the page; the agency commission 15 per cent; the cash discount two per cent.

The circulation at the outset will be 75,000, net paid, A.B.C.

McGRAW-HILL PUBLISHING CO., INC.

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AVIATION

The Oldest American Aeronautical Magazine

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JAMES H. MCGRAW, JR. *Publishing Director*

R. SIDNEY BOWEN, JR. *Associate Editor*

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JAMES P. WINES *Assistant Editor*

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CHARLES H. GALE *Assistant Editor*

CHARLES F. MCREYNOLDS *Pacific Coast Editor*

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McGRAW-HILL PUBLISHING COMPANY, INC.
Tenth Avenue at 36th Street, New York, N. Y.

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Cable Address: "Machinist, N. Y."

NEW YORK Dist. Office, 285 Madison Ave.
WASHINGTON, National Press Building
CHICAGO, 520 N. Michigan Ave.
PHILADELPHIA, 1600 Arch Street
CLEVELAND, Guardian Building
ST. LOUIS, Bell Telephone Building
SAN FRANCISCO, 883 Mission Street
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Aviation . . . Electrical World . . . American Machinist . . . Bus Transportation Electrical Merchandising . . . Engineering and Mining Journal . . . Coal Age Chemical and Metallurgical Engineering . . . Radio Retailing . . . Food Industries Electric Railway Journal . . . Engineering News-Record . . . Construction Methods Power . . . Electrical West *(Published in San Francisco)* . . . Ingeniería Internacional American Machinist—European Edition *(Published in London)*

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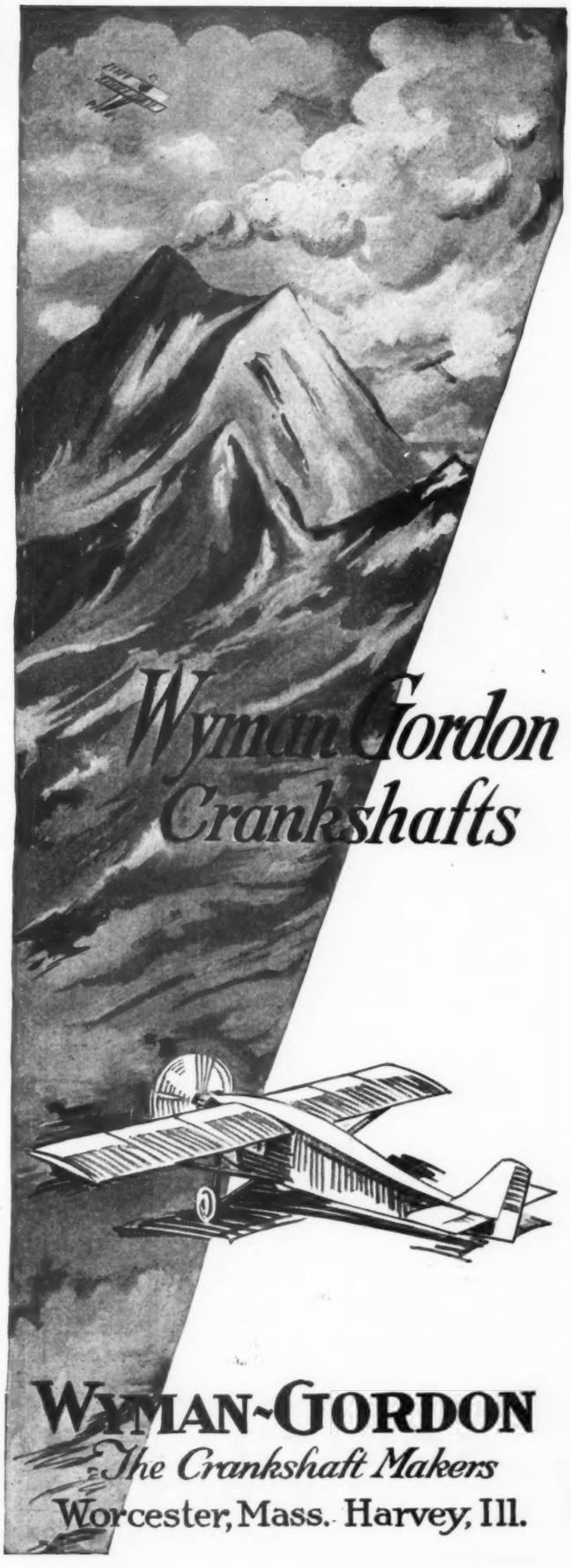

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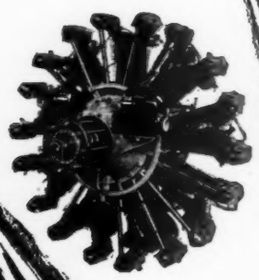
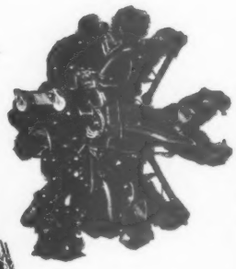


Wright Whirlwind J-5



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SCINTILLA MAGNETO CO. Inc.
SIDNEY – NEW YORK
Contractors to the U.S. Army and Navy

AVIATION

THE OLDEST AMERICAN AERONAUTICAL MAGAZINE

June 29, 1929

VOLUME 26 . . . NUMBER 26

The Airplane Mechanic

CAREFUL and experienced supervision of both plane and engine is one of the major secrets of safe and successful flying. Good ground work is as important as good air work. At present the Department of Commerce grants mechanics' licenses but the requirements are not strict enough so that the holding of a mechanic's license guarantees the ability of the holder. The Aviation Mechanics' Association brings to our attention that much work being done by unskilled mechanics is being OK'd by licensed mechanics and especially by pilots holding mechanic's licenses, without their having been present. This they claim is injuring the *bona fide* mechanic and they suggest as a remedy that a mechanic's apprentice licence be granted.

It seems to us, however, that no examination can give the real measure of what a man has learned from his past experience, and that it gives an even less idea of whether he does his work conscientiously. Every repair shop should have a supervisor who is competent to judge whether the mechanics are doing good repair work in a reasonable amount of time.

Raising the standards of mechanics is highly desirable but can best be accomplished through private means rather than by government agency. The Mechanics' Association itself should prove a powerful means of raising standards and improving present conditions. If the Association selects its members with care and disciplines those who prove unworthy, membership in it would mean more than any card given out by the Government.

//

More Gliding

GLIDING has proved in Germany to be much more than a sport. With the thousands of natural air pilots produced by training on gliders we may find eventually that gliding is the back bone of all flight training. Certainly it is the next logical step for the many thousands of boys who have been so enthusiastically building and flying model planes in this country.

With the American genius for quantity production it is logical that the price of good manufactured gliders, approved by the Department of Commerce, should be materially lowered. At the same time we should be able to so organize gliding activities in this country that they will be conducted in a safe and sane way.

There are already three national gliding societies in America. Dozens of good glider pilots have been developed and many plane pilots are taking up gliding as a sport. If manufacturers will get squarely behind the program for glider flying we may expect immediate results of the greatest significance to all aviation activity.

//

The Paradox Plane

THE most dangerous plane in the Navy has by far the best safety record. The planes of the HS2L type are pusher flying boats powered with a Liberty engine. They are unstable longitudinally and are apt to slip off on a wing without warning. They go into a spin easily and are next to impossible to get out. They are decidedly underpowered and the Navy in 1923 branded them as too dangerous for any violent maneuvers, yet this type of plane, during the last three years when it was in use, was flown nearly thirty thousand hours or over two million miles without a fatal accident.

Several lessons can be drawn from this paradox. In the first place it shows that accident statistics must be studied with considerable care and intelligence. In the second place it shows that a good safety record depends on careful operation held within the limits of what a plane is capable of doing. The HS2L's, after they were pronounced as dangerous, were used only for patrol and cruising work under favorable conditions. They did not take part in any maneuvers that necessitated anything but straight flying. The third conclusion applies to pilots. As one Navy man put it, "all the good HS2L pilots were killed off by 1923 and thereafter there were no more accidents."

This sounds like another paradox but is not. What he meant was that there were a certain group of pilots who had become very expert in the handling of the boats. They threw them around as only an unstable plane can be thrown around, but the plane was "tricky" and every so often a pilot would not pull out.

Comments REGARDING THE SELECTION OF

"AVIATION" and its readers are fortunate in securing the services of Edward P. Warner as Editor of that publication. I had the privilege of being in virtually daily contact with Mr. Warner while he served as Assistant Secretary of the Navy in Charge of Naval Aeronautics. During that period I was deeply impressed by his thorough knowledge of aviation in all its branches. That this knowledge, which did so much toward the development and expansion of Naval flying, will be at the disposal of the readers of your magazine is bound to be of great advantage to the general progress of American aeronautics—an advancement in which soundly conducted aviation publications have played, and will continue to play, a highly important rôle. F. TRUBEE DAVISON,
Assistant Secretary of War.

I CONGRATULATE your organization on securing Mr. Warner as editor of your publication. I consider Mr. Warner one of the leading authorities on aviation in the country and his recent experience as Assistant Secretary of the Navy for Aeronautics gave him further opportunity to add to his already wide range of knowledge and experience. I feel certain that Mr. Warner's faculty for leadership will make itself felt through AVIATION and I wish for him and your organization the greatest measure of success. JOHN H. TRUMBULL,
Governor, State of Connecticut.

MR. WARNER'S record both with the Massachusetts Institute of Technology and later as Assistant Secretary of the Navy for Aeronautics brings to your publication an experience and knowledge of the aviation industry which of itself is unexcelled. In addition, his exceptional quality for constructive and clear thinking should result in the leadership for AVIATION which will be of benefit not only to your publication but to the industry as a whole. RICHARD F. HOYT,
Hayden, Stone & Co.

I AM delighted to hear that Mr. Warner is to join your organization and carry on in another field the good work that he has been doing for so many years, both in Massachusetts Institute of Technology and in the United States Navy. His great ability, high character and public reputation will, I believe, prove to be first-class assets for your publication. C. M. KEYS,
President, Curtiss Airplane & Motor Co., Inc.

I AM delighted to know that Prof. Edward P. Warner will become associated with the McGraw-Hill organization as Editor of AVIATION. I do not know of anyone who is so ably fitted to fill this position. Professor Warner's intellectual qualities, his educational background, his wide acquaintanceship in aeronautical circles, and his intimate knowledge of present-day aeronautical problems are indications that AVIATION under his leadership will have a farreaching influence in aeronautics.
HARRY F. GUGGENHEIM,
President, The Daniel Guggenheim Fund for the Promotion of Aeronautics, Inc.

THE past record of Mr. Warner in public service and particularly in aeronautics is a brilliant one, and his thorough understanding of the problems and possibilities of aviation make him an ideal man for the position he has now accepted.

May I wish Mr. Warner and the McGraw-Hill Publishing Company every success in their new association.
A. H. G. FOKKER,
Fokker Aircraft Corporation of America.

WE WISH to congratulate you on your good fortune in obtaining the services of Edward P. Warner as Editor of AVIATION. We are sure that with the services of such an outstanding leader in the field your publication will be able to render an improved service of great value to the industry.

With best wishes for the success of this new arrangement, we are I. I. SIKORSKY,
President, Sikorsky Aviation Corporation.

MR. WARNER'S technical knowledge and intimate contact with every phase of aviation equips him singularly well for the editorship of AVIATION. It affords McGraw-Hill the opportunity to render service to an important and rapidly growing industry.
W. A. MOFFETT,
Rear Admiral, U.S.N.,
Chief of the Bureau of Aeronautics.

I WISH to congratulate you on securing Edward P. Warner as Editor of AVIATION. His past contributions to the science of aeronautics from an engineering and educational standpoint should make him an excellent selection to keep the public advised of the progress of this great industry through your publication.
P. W. LITCHFIELD,
President, the Goodyear Tire & Rubber Co.

IT WAS a constructive and farsighted move to persuade Mr. Warner to join your staff as editor of AVIATION. The public needs specialized and accurate information and one way to supply this is to seek the services of specialists. I am sure Mr. Warner will prove a valuable addition to your organization. D. A. REED,
Committee on Finance, United States Senate.

Edward P. Warner AS EDITOR OF "AVIATION"

MR. WARNER, while here in the Navy Department as Assistant Secretary for Aeronautics, made a wonderful name for himself and did much to further the advancement of commercial aviation. He is a real friend of aviation and I am sure will continue to prove to be such as editor of this most forward-looking magazine AVIATION.

AVIATION has a real place in the picture of commercial aviation. It is supplying, through its columns, just the information and material that we all desire and, now, with Ed. Warner as its editor and his host of friends and his wonderful knowledge of conditions, am sure we will need AVIATION more than ever before.

W. IRVING GLOVER,
Second Assistant Postmaster-General.

THE widespread enthusiam in this field throughout the nation requires only effective leadership to bring it to a point of real accomplishment. There is no single medium through which this purpose can be more vigorously advanced than by the efforts of a well directed trade press. Mr. Warner's truly extraordinary record in this field certainly qualifies him as undoubtedly the outstanding candidate for this task. Your company, and particularly the aviation interests of the country as a whole, are to be congratulated upon his appointment.

JULIUS KLEIN,
Assistant Secretary of Commerce.

PLEASE accept my hearty congratulations on your securing the services of E. P. Warner.

It seems to me that Ed. Warner is an ideal man for this very important job, and I feel sure that he will fill it to the satisfaction of all interested in the development of aviation.

S. E. LAND,
Vice-President, The Daniel Guggenheim Fund for the Promotion of Aeronautics, Inc.

YOUR organization is indeed fortunate in securing the services of Edward P. Warner as Editor of AVIATION. Mr. Warner will be able to bring to his new position exceptional ability and a thorough knowledge of the needs of aviation and will render an important service to this rapidly growing industry. I extend to Mr. Warner my best wishes in his new field.

F. E. FECHET,
Major General, Air Corps, Chief of the Air Corps.

I CERTAINLY want to congratulate you upon your choice of Edward P. Warner as the Editor of your magazine AVIATION. I have known Mr. Warner several years, and have a great admiration for his record at Boston and for the record which he made as an Assistant Secretary of the Navy. His accurate knowledge on the subject of technique of flying and his broad experience will, I am certain, make him extremely valuable in your publishing work.

PAUL HENDERSON,
Vice-President, T.A.T.

IT IS believed you have made a very fortunate choice in the selection of Edward P. Warner as Editor of AVIATION. Many of us have followed his interesting career, first at the Massachusetts Institute of Technology, and later as Assistant Secretary of the Navy Department. Mr. Warner is among the pioneers in our industry, and throughout his career has contributed greatly to the advancement and perfection of the art.

F. B. RENTSCHLER,
President, Pratt & Whitney Aircraft Co.

IT WAS with great pleasure that I learned that Edward P. Warner is to be associated with your company as Editor of AVIATION. Mr. Warner's distinguished career in the aeronautical engineering field, as author of numerous publications on the subject, and as Assistant Secretary of the Navy for Aeronautics all render him an ideal man for this position, and I congratulate you on the opportunity afforded the McGraw-Hill Publishing Company by his association with you to render service to an important and rapidly growing industry.

DAVID S. INGALLS,
Assistant Secretary of the Navy for Aeronautics.

MR. WARNER'S unusual service and accomplishments in engineering, educational and governmental positions have given him a breadth of experience which can be advantageously exercised in the position which you have afforded him. You are to be congratulated on your selection and I feel that Mr. Warner will have an unusual opportunity through your paper of continuing his guidance of aeronautics along sane and progressive lines.

Allow me to extend to both my best wishes for the future.

W. E. GILLMORE,
Brig. General, Air Corps, Chief, Materiel Division.

ALL who know Mr. Warner recognize in him a leading spirit in the development of aviation on this continent. Few men have such an all-round knowledge of aviation. He is equally experienced in the technical, operating and administrative phases of aeronautics.

J. A. WILSON,
Controller of Civil Aviation, Canada.

I WAS delighted to learn from your letter of the 12th instant that Edward P. Warner, recently Assistant Secretary of the Navy for Aeronautics, is to join your organization and become Editor of AVIATION. Mr. Warner is thoroughly identified with the development of aeronautics in this country and especially fitted to bring to this magazine talents and the quality of leadership which should add greatly to the value of the publication in question.

MASON M. PATRICK,
Public Utilities Commission of the District of Columbia.

THE *Operation* OF WESTERN *AIRWAYS,*

By EARL HANSON

PROBABLY nowhere in the world have aircraft demonstrated their usefulness to a greater extent than in northern Canada. For here, meeting pioneer conditions, competing with canoe, dog team, and pack-sack transportation, they have not only been able to show savings of time estimated in weeks and months rather than hours, but generally a real saving in transportation costs as well. It is the airplane, reaching into all parts of the Dominion, for aerial surveys, forest patrol, reconnaissance and direct transportation of men and materials, that has made possible Canada's present northward expansion and has pushed it ahead by at least 50 yr.

In Canada the plane is essentially a pioneer-instrument that begins where the railroad and the steamship and the automobile end. It carries its activities, technical and commercial, into the wilderness, without the help of beacons, landing fields or hangers, often operating from gas caches which have been placed all over the northern wilds by the Canadian air force as well as the various commercial concerns. It flies with skis in winter and floats in summer, utilizing the millions of lakes that cover the entire Canadian North. In regions where every year prospectors, traders, and trappers are lost, drowned from overturned canoes, lost in the woods, frozen in winter, starved in summer, it has operated so far without a single casualty.

Western Canada Airways, Ltd., of Winnipeg has done more than any other company toward opening Canada's north and serving the Dominion's mining, construction, and prospecting activities. It was organized in 1926 and began operations at Christmas time of that year with one Fokker Universal, at Hudson, Ont., serving the Red Lake mining area to the north. Since then, its flying equipment and activities have steadily grown.

BY NOVEMBER 20, 1928, the company had: 9 Fokker Universal, 4 place monoplanes—8 Fokker Super-Universal, 6 place monoplanes—1 Fairchild, 4 place monoplane—1 Fokker tri-motor, 10 place monoplane—2 Boeing Flying Boats—1 Vedette (Vickers)—1 Moth, 2 place—4 Avro Avians, 2 place.

By the end of November, its operating record was:

Hours flown	6,677 and 28 min.
Miles flown	531,517
Passengers carried	9,018
Express carried	1,192,057 lb.
Mail carried	122,170 lb.
No. of flights	9,335

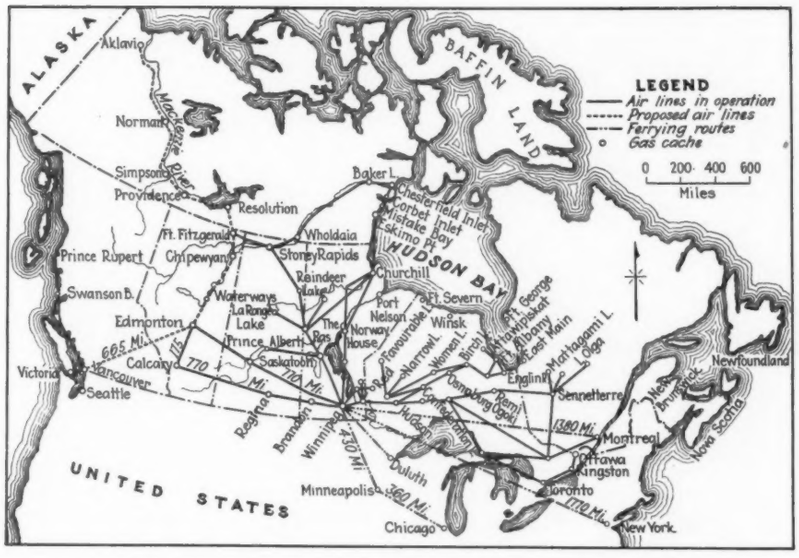
A large number of flights during this time had to be made for reconnaissance purposes and for the purpose of establishing gas caches at outlying points. These non-revenue producing flights totaled as follows:

Air hours	580.01
Miles flown	45,173
No. of flights made	821
Total loads carried	8,311 ton miles

The quantities in the latter tabulation are included in those of the table of operations above, but it must be remembered that with caches laid down at strategic

Three planes of Western Canada Airways, Ltd., beached at Cranberry Portage

CANADA LTD.



An outline map of Canada showing the routes now operated by Western Canada Airways, Ltd., and those proposed

points, the operating ratio of payload to mileage will in the future be greatly bettered.

Since November, 1928, the flying equipment has again been increased by the addition of 2 Boeing Boats and one Junkers.

The activities of Western Canada Airways at Cranberry Portage, Manitoba, may be taken as typical of the pioneer work done by the entire company.

This town, which has sprung into existence only in the last year, lies on the new railroad from The Pas to the Flin Flon mine, near the junction of that road with the one, now being built, to the new Sherritt-Gordon property. It is the center of a great mining and prospecting rush, the "jumping off place" to the mineralized regions to the north. Its slogan, carried by its young newspaper, is "Where the rail meets the Trail."

The settlement at Cold Lake, Manitoba, which is one of those served by Western Canada Airways

The work of the company at this point consists of carrying anything from mail to diamond drills, from prospectors to sportsmen, as well as giving flying instructions to ambitious mining engineers.

The base is operated with the help of one auxiliary base, at Mile 137 of the Hudson Bay Railroad, serving the active Oxford Lake region to the east, and no less than eleven gas caches, located at the following points: Cold Lake, Pukatawagan, Island Falls, Rabbit River (Wapus River), Southbend, Pelican Narrows, Split Lake, Jackfish Island on the Nelson River, Churchill, Eskimo Point, and Chesterfield Inlet.

In addition to the above caches, however, there are numerous others, belonging to the Dominion Air Force, the Northern Aerial Minerals Exploration Company and others, accessible to Western Canada Airways fliers under a reciprocal aid agreement.

The quantities put down at the caches vary with estimates of future importance of the points where they are located. Island Falls for instance, the site of a future 44,000 hp. power plant for the Flin Flon mine, now under construction, has 100 barrels of gasoline and 5 barrels of oil. Cold Lake, where a new base will soon be established, has a similar quantity. Southbend has only ten barrels of gasoline, and some other points have only five.

The busiest route so far, and the only one over which regular schedule service was carried on, has been to the town of Cold Lake, forty miles to the north. This town sprang into existence about a year ago, and lives at present as a tributary to Sherritt-Gordon, where some 300 workers are building up the mine that is destined to become one of the major copper producers in Canada.

Daily, often almost hourly, trips are made from Cranberry Portage to Cold Lake, and under contract agreement with the Dominion Government, Western Canada Airways now carries mail into the latter town twice a week.

This mail business, however, is undertaken mainly for advertising and good-will purposes, and cannot, under the present arrangement, produce any profits. Mail is carried for $25 the round trip for the first hundred pounds, and 10c. per pound for anything over that quantity. The citizens of Cold Lake and Sherritt-Gordon pay nothing extra for their airmail service, their letters go at the regular 2c. rate when they are included in the regular mail flights. Special letters, however, sent on other than regular trips, are carried for 10c. each, and before the government contract went into effect, Western Canada Airways, under agreement with the Canadian post office, carried most of the Cold Lake mail using its own stamps.

The government contract too, is entirely tentative, and

will terminate when the new railroad to Gold Lake is complete, after which any letters carried to and from Cold Lake by plane will again go at the 10c. rate.

A NEW BASE will be established at Cold Lake when the railroad is finished to that point, and there is some possibility that it will be the main base of the region. Certainly it will be the main base for operations northward, with Cranberry Portage operating east and west. Even last winter traffic to Cold Lake fell off an appreciable amount, because the light snows of the season made automobile taxi service over the frozen lakes and portages possible.

THE PAS MINERAL AREA

WESTERN CANADA AIRWAYS, LTD.

RATES

$ PASSENGER RATES	The Pas.	Cranberry Portage	Sourdough	Smith Pride	Cold Lake	Mandy	Flin Flon	Herb Lake P.O.	Elbow Lake	Herb Lake	MILES Sourdough	MILES Cranberry P.	MILES The Pas
The Pas.		38	45	65	65	45	45	80			75	62	
Cranberry P.	38		25	35	35	25	25		30	60	25		62
Sourdough	45	25		30		15						25	75
Express per Lb ¢													
Herb Lake P.O.	22												110
Herb Lake		14										72	
Smith Pride	20	10	07								36	45	103
Cold Lake	20	10										45	103
Mandy	14	06	03								15	30	75
Flin Flon	14	06										34	79
Sourdough	14	05		07		03						25	75
Elbow Lake		07										35	
Cranberry P.	12		05	10	10	06	06		07	14	25		62

NO RETURN TICKETS

=Charter= =Rates= Places Outside Area $1.15 per Mile Plus $50.00 per Day

Places Outside 250 Mile Radius $1.25 per Mile Plus $50.00 per Day

Super-Universal $1.50 per Mile, Plus $75.00 per Day

Above: Chart showing the rates charged by Western Canada Airways, Ltd., for carrying passengers and express over the Pas Mineral Area. Below: The base of the operating company at Cranberry Portage

The operations over the Cranberry-Cold Lake route during the last year, from the time the lakes froze over in 1927 until operations had to stop because of the freeze-up in 1928, were as follows:

Total hours flown	1,154.58
Total miles flown	92,362
Number of round trip flights	1,345
Mail carried	3,074 lb.
Express carried	226,406 lb.
Passengers carried	1,361

The rest of the business out of Cranberry Portage is purely on special contract. Passengers and express freight, mail, perishable groceries and machinery, are carried wherever needed. Because of the mining boom a good many diamond drills are transported. These are necessarily gasoline drills, weighing about ten tons each, and capable of being split up into 1,500 lb. loads. Steam drills cannot be transported because of the heavy boilers.

Just before Christmas 18 men and 24 tons of supplies were carried for the Consolidated Smelters Company into their new nickel and copper property at Rottenstone Lake, 250 mi. away. A new base at Island Falls is now being planned to serve this region.

The farthest trips of last year were made to Rankine Inlet and Eskimo Point, on the west coast of Hudson Bay, carrying men and supplies for prospecting syndicates. Four trips were made to the first-named point and one to the latter.

Total operations out of Cranberry for the last season, one winter and one summer, were as follows:

Total hours flown	1,732.47
Total miles flown	138,544
Total trips made	2,018
Passengers carried	2,041
Express carried	342,610 lb.
Mail carried	4,611 lb.

The payload that can be carried necessarily varies with season and distance. In winter, when the planes are equipped with skis a good load is about 1,000 lb., 250 lb. more than in summer when the plane is on floats. The

Above: A view of the slipway and the planes on the ice. Note the "nose hangar" at the right, which is used for keeping the engine of a plane warm. Below: The gasoline cache and one of W. C. A. planes at Cranberry Portage

Super-Universal can carry about 1,800 lb., from 300 to 400 lb. more in winter than in summer. Rates for the region are shown in the accompanying chart.

These rates are based on an estimated performance of 50 per cent load, and it may be seen from the table that they vary on a sliding scale from 60c. to $1.00 per passenger mile, and average about 2c per pound mile for express. It must be remembered, in considering these rates, that the mileage for the plane is generally doubled, for on special work of this kind there is often little prospect of payload on the return trip.

Also it is likely that these rates will be subject to change in the future. Even operating companies in the United States, flying on regular schedules, have difficulty in determining a real figure for costs per mile. The industry is too new and expanding too rapidly. Pay load varies, operating practice affecting overhead etc. has not yet been standardized, and no reliable figures are available regarding the life of modern equipment.

In the Canadian wilds, the difficulties are enormously increased. Regular schedules are conspicuous by their absence, and gas caches have often to be estimated mainly by guess. A new find in some mining region may cause a rush that will use up a cache in a few weeks' time, at another point the labor and expense involved in caching gas may be entirely wasted. The price of gasoline, oil, and other supplies varies with localities and difficulties of transport. Moreover, interruptions in service in the spring and fall are incalculable since they depend on the weather. During the spring break-up and the autumn freeze-up, the planes necessarily lie idle for periods that vary from 2½ weeks to over one month.

THE PRESENT EQUIPMENT at Cranberry Portage is as follows: 4 Fokker Universals, with Wright Whirlwind engines. One Fokker Super Universal, with Wasp engine, and one Avro Avian with Cirrus engine. The latter is used for reconnaissance and for flight instruction at $30 per hr. Two of the Universals were received in January this year.

The skis for winter use are made by Elliott Brothers of Sioux Lookout, Ont., the same firm that built the skis in use on the Byrd expedition. The floats are both of Edo and Hamilton make.

The planes are moored in the open. No hangars are used except one nose hangar, developed by Western Canada Airways personnel. This consists of a corrugated iron house, built in sections and transportable, 14 ft. x 16 ft. in size, with a door at each end, to admit the nose and engine of the plane. It is designed entirely to facilitate work on the engine in wet weather in the summer and at the low winter temperatures of from 45 to 50 degrees below zero.

The present personnel at Cranberry Portage consists of the following men:

1 Superintendent, 1 Business Agent, 5 Pilots, 4 Air Engineers (Mechanics) and 2 Apprentices.

The work of Western Canada Airways is at present only about two years old. With its pioneer work and its many varied activities, the company is probably unique in the aeronautical world. And there is every indication that its future is a bright one. Canada's northward spread is only beginning. Prospectors are rushing into the northland. New claims are staked, new strikes reported every day. The airplane is the prime factor in developing the mining properties that lie in out-of-the-way places awaiting railroads.

Increased PRODUCTION WITH Decreased PERSONNEL

By JOHN T. NEVILL

INCREASED PRODUCTION with decreased personnel—an exceedingly pleasant state of affairs in any industry, from the manufacturer's viewpoint, has been accomplished by Stinson Aircraft Corporation in its new 10-acre factory, located near Wayne, Mich., which it moved into last April 1.

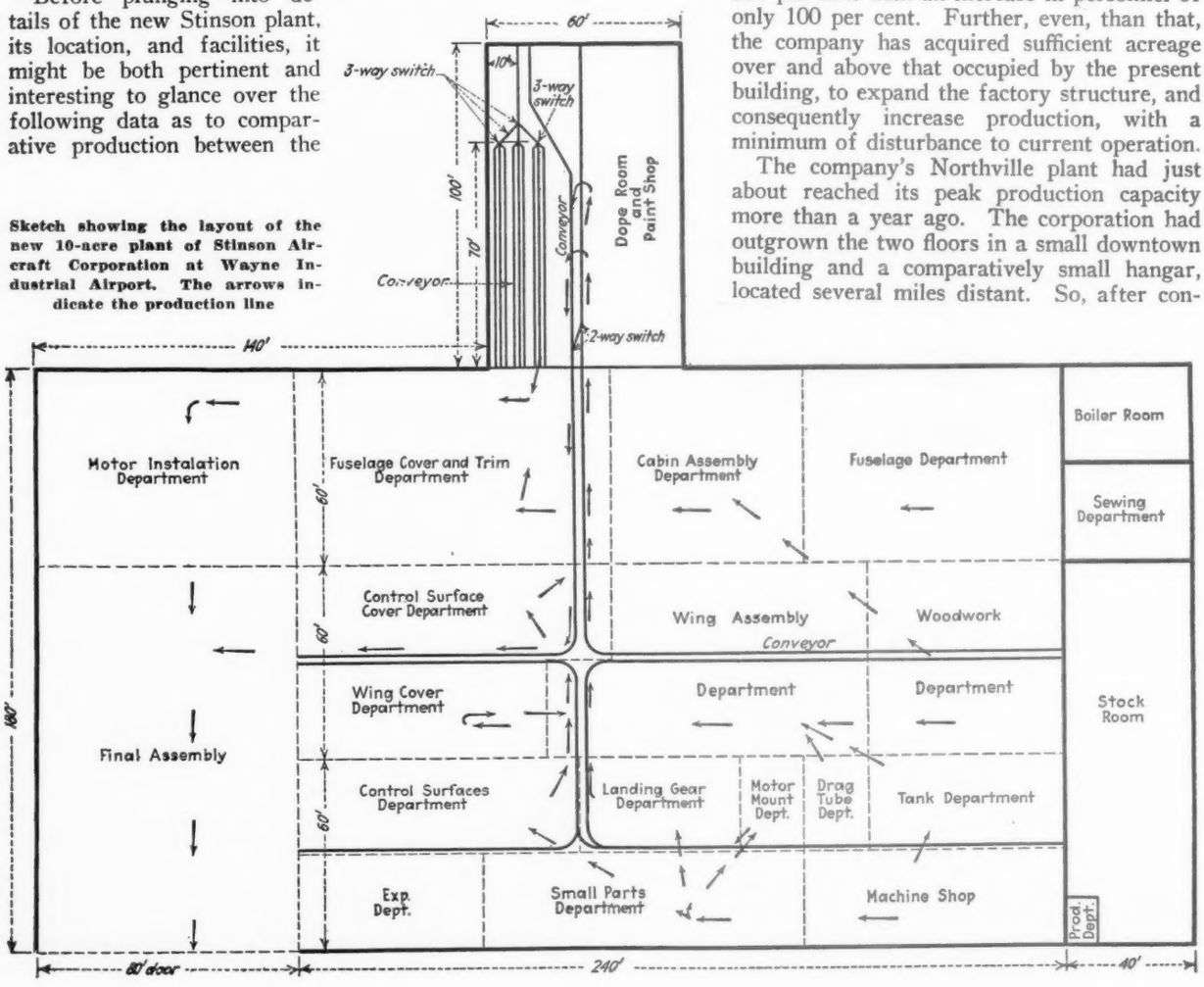
This achievement, according to "Ben" Jacobson, factory manager, briefly, resulted from the introduction of production methods not possible in the Northville building formerly occupied by the Stinson Corporation.

Before plunging into details of the new Stinson plant, its location, and facilities, it might be both pertinent and interesting to glance over the following data as to comparative production between the factory at Northville and the present factory at Wayne.

	Northville Plant	*Wayne Plant*
Floor space	42,000 sq.ft.	85,000 sq.ft. (Including hangar at field)
Men employed	250 (average)	162 (average)
Hours worked	9 hr. (and overtime)	8 hr. (no overtime)
Production	1 plane daily	2 planes daily

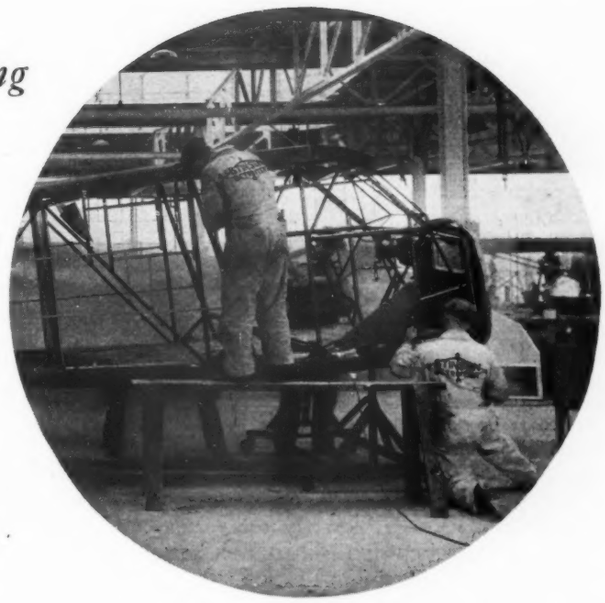
In addition, the present plant is so equipped and so located, Mr. Jacobson said, that, beginning at any time, the company can increase its production by approximately 500 per cent with an increase in personnel of only 100 per cent. Further, even, than that, the company has acquired sufficient acreage over and above that occupied by the present building, to expand the factory structure, and consequently increase production, with a minimum of disturbance to current operation.

The company's Northville plant had just about reached its peak production capacity more than a year ago. The corporation had outgrown the two floors in a small downtown building and a comparatively small hangar, located several miles distant. So, after con-



Sketch showing the layout of the new 10-acre plant of Stinson Aircraft Corporation at Wayne Industrial Airport. The arrows indicate the production line

Some Facts and Figures Regarding Stinson Aircraft Corporation Manufacturing Methods at Its New Factory



Finishing a fuselage structure at the Stinson factory

siderable deliberation, backers of the company, with the assistance of the Detroit Board of Commerce and the Wayne District Association, went in with a group of Detroit and Wayne business men, formed an airport corporation, and purchased the site now under development as an industrial airport.

Since it is the writer's intention to devote a later article to the airport venture we will not go into that now, except to say the tract is approximately 640 acres square, with a squared 240 acres in the center to serve as the airport proper, and is located just southwest of Wayne, or about 18 mi. southwest of the Detroit City Hall.

THE NEW Stinson factory proper is 180 ft. wide and 400 ft. long, one storied, and built of brick and steel. The office structure, of similar construction, is 47 ft. deep and 107 ft. wide, fronting west directly on the airport. The two buildings are approximately 20 ft. apart, with a corridor, 10 ft. wide, connecting them. The factory proper is rectangular in shape, except for a 60-ft. x 100-ft. dope room, which projects about midway along the building's northern side. The dope room, which, of course, was designed "off-side" as a safety measure, is located at that point along the various assembly lines where it is most easily accessible when needed. Fireproof sliding doors have been provided, shutting it off entirely from the remainder of the plant, when that is desired.

The back of the building, running due north and south, extends along the Pere Marquette railway, from which a spur track runs in and alongside a platform behind the airplane factory. Daytime lighting is well provided by approximately 13,000 sq.ft. of skylights, and by three-fourths of the side-walling along both the north and the south sides of the plant, which is glazed glass, framed in steel.

Inside the factory there are only two rows of supporting columns, located to provide three 60-ft. bays extending lengthwise through the building, and one 80-ft. bay running crosswise.

Alongside the spur track, and located 125 ft. south of the main factory building, the Stinson Corporation, at this writing, is installing one of the most interesting features of the entire plant—a generating unit for acetylene gas for welding purposes. Here, also, is located a storage house for oxygen bottles. Aside from its value from the standpoint of safety and efficiency, this unit should prove to be a decided economic factor, representing the very latest thing in aircraft production methods.

There are a number of features of the Stinson plant, that, due to the recentness of the structure's completion, were not in operation when this writer visited the plant, but, in every case, those features were to be in operation early in June. Therefore, we shall speak of them as though they were already functioning. Included among these items, besides the modified Oxweld acetylene generating unit, already mentioned, are the overhead conveyor system and three huge spray booths in the dope room.

Before seeing the material fed into the assembly lines, let us get acquainted, briefly, with the various departments contributing to the finished product.

The Stinson stock room is 40 ft. wide and 120 ft. long, and located in the southern rear end of the building. It is of sufficient size to store, and does store, according to Mr. Jacobson, enough material to keep up accustomed production for about three weeks without replenishment. This, of course, enables the company to purchase all stable materials in large quantities, effecting some saving along that score.

JUST NORTH of the stock-room is the fabric room, and sewing department, where all fabric is cut and sewed to pattern. Girls are employed for this work. North of the fabric room and in the northwest corner of the building, is the boiler room, equipped with two Kewanee boilers fed with Simplex oil burners. The boilers are used only for heating purposes and are fed from a 15,000-gal. tank placed underground just outside the boiler room door. The boiler room and the fabric room are identically the same size, being 40x30 ft.

In that bay extending along the northern portion of the building and west of those departments mentioned, we find, from east to west, the fuselage assembly and welding department, the cabin assembly department, and the fuselage covering and trimming department. In the central bay, correspondingly, is the woodworking department, wing assembly department, the control surface

covering department and wing covering department,—the latter two being abreast of one another. The southern east-to-west bay contains, in order of progress west, the tank department and machine shop (located abreast), drag tube department, motor mount department, landing gear department, small parts department, control surfaces department, and experimental department (the latter for the present used as a service department). The north-south bay, running along the western end of the building is 80 ft. wide and 180 ft. long. It might be called the "home stretch" of the main assembly line, and contains, in its northern third the engine installation department. In the southern two-thirds comes the final assembly, after which the finished plane is rolled out of an 80-ft. door, and approximately 100 ft. west, when it is on the field and ready for flight.

The door to the dope room, of course, opens to the north in the center of the northern side of the upper east-west bay. There, it is most convenient to the path of travel of the heaviest dope-treated parts. Space will not permit detailing description of the various departments, but it is worthy of note that the Stinson paint shop contains three spray booths, each 14 ft. wide, 15 ft. high and 30 ft. long, and each equipped with 48-in. induction-type blowers, having a capacity of 18,000 cu.ft. of air per minute.

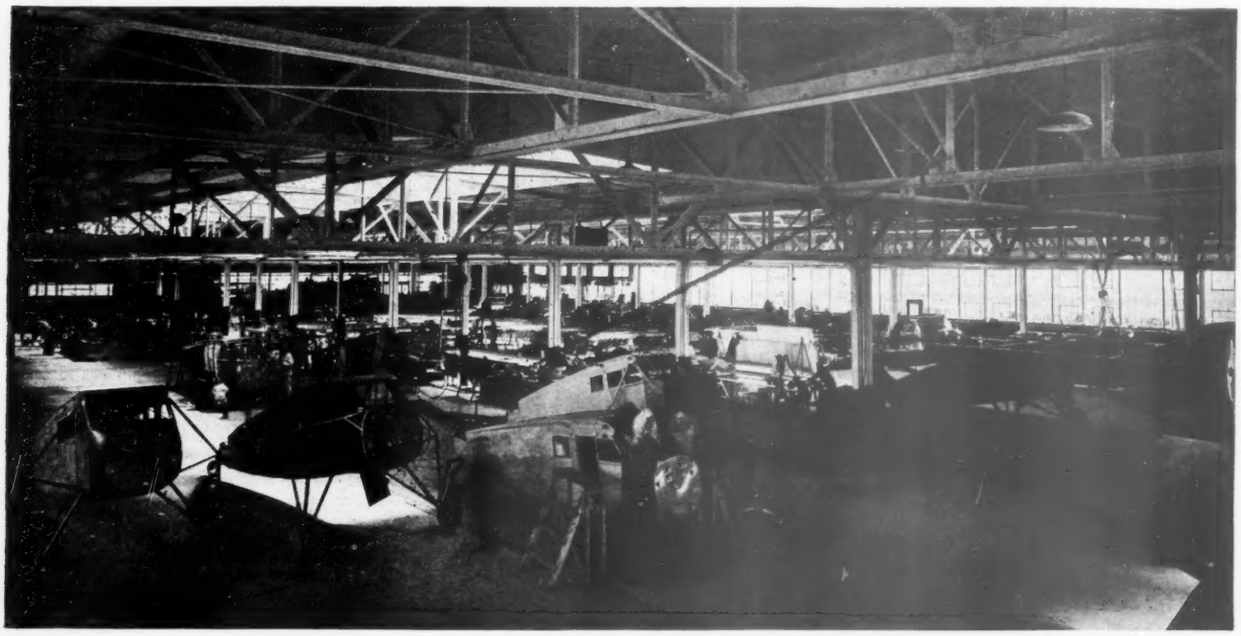
The three spray booths, which were installed by the Newcomb David Company, are located side by side in the northern end of the dope room. The one on the east is used for priming and varnishing, the one in the center for doping, and the one on the west for coloring. While a 10-track overhead conveyor system has been installed in order to accelerate treatment of the more numerous wings and control surfaces, the fuselage is trucked into the dope room. The main overhead conveyor, incidentally, leads out of the dope room and extends north and south nearly all of the way across the 180 ft. width of the plant, having two transverse lines extending down the centers of the two lower bays.

Theoretically, the Stinson assembly line is "L" shaped, with the fuselage assembly, welding, covering and trimming departments comprising the long arm of the "L." The short arm, then, would be the engine installation and final assembly departments, the former including the landing gear, and the latter, the wing and control surface assembly, and the rigging.

Practically all stock entering the Stinson stock-room, except for the engines, and a few smaller materials, comes in by rail and is unloaded from the spur track to the stockroom platform. Every bit of it is then thoroughly examined for flaws before being placed in the bins or on the racks. Tubular steel drawn from the stockroom goes to the eastern end, or the beginning of the fuselage assembly line, where five fuselage jigs, embracing the three types of Stinson monoplanes produced, are located. Two of these jigs are for Stinson-Detroiters, powered with 300 hp. Wright engines; two for Stinson Juniors, equipped with either 165 hp. or 225 hp. "Whirlwind," or 150 hp. Continental A-70 engines, and one for the Stinson-Detroiter, powered with a "Wasp" engine.

THESE LINES then progress west, through the welding process, before making their initial trip into the dope room for priming. Right here it might be in order to say that, thanks to the advanced method of distributing welding gases, all welding is done by means of two rubber hoses, extending to the torch from overhead pipes within the plant. Outside the plant the acetylene and oxygen is piped from the generating and storage units to the plant in underground pipes, 3-in. piping being employed for the acetylene and 1½-in. for the oxygen. As a precautionary move, these pipe joints are welded together, rather than joined with nipples or any other fitting. Thus, the use of gas bottles, perched upon hand-trucks, with troublesome hoses, usually in the way, has been eliminated. The advantages of this method of installation are very readily seen.

But to get back to our assembly lines: We left the fuselage getting a primer in the dope room. In the meantime, various wooden stock has been drawn from the stock-room and into the woodworking department, which



An interior view of the main structure of the new Stinson Aircraft Corporation plant near Wayne, Mich.

is just west of the stockroom, or at the beginning of the central, or wing construction bay. There a "sticker" shapes all angles of the spars in one operation, and there the planing, routing, fairing, and general cutting to measure is completed. The spars and that material destined for ribs, etc., moves west, in two lines, i.e., material for Stinson Juniors in a northern line, and material for the larger type in a southern line, the lines being separated by the northermost transverse monorail conveyor. However, that portion of the wood cut for "boxing" and cabin assembly work travels northwest out of the woodworking department, where it meets the welded fuselage, just returning from its initial trip to the dope room.

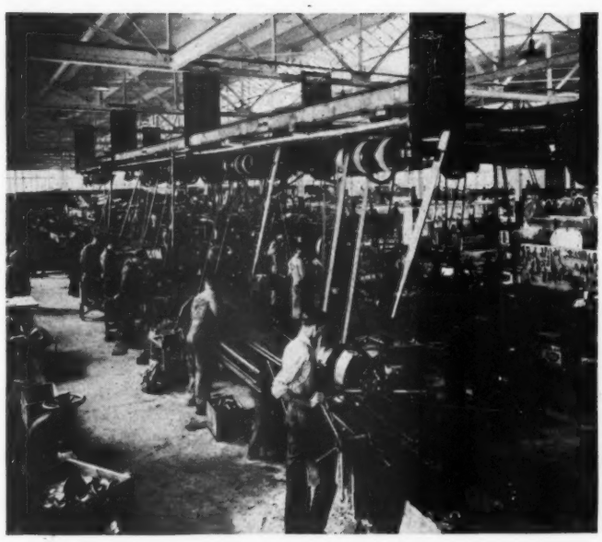
Now, while workmen are completing the boxing, et cetera, we will return to the central bay, where other workmen are building ribs on rib jigs, slipping them over spars, and assembling the wings on two rows of wing stands. During the course of this assembly various metal parts entering into the wing are moved up from the sub-assembly departments in the southern bay. These include metal gussets and fittings produced in the machine shop, the fuel tanks and the drag tubes. When they are installed and the skeleton wing completed it again moves west to the covering department. It is noteworthy here that wings are not moved from one stand to another before completion. Rather, the 10 men, who work in pairs and are assigned to the various jobs in the wing department, are moved from one stand to another.

WHILE THE WINGS are being covered we return to the fuselage assembly bay, where we find the boxing completed, and the fuselage again being tucked into the dope room, this time to get a coat of varnish for the woodwork upon it.

As the cabin assembly department is located just east of the main conveyor, which extends straight out through the center of the dope room door, the fuselage covering and trimming department is located just west of it. So, when the varnish has been applied to the boxing, the fuselage again re-enters the main plant, finding itself in the proper department as soon as it passes through the dope room door.

During this time other work originating among the sub-assembly departments has been progressing. Small parts have been moved a few steps northeast to the engine mount department, engine mounts have been welded and completed, placed upon the southernmost transverse conveyor, and taken to the dope room for treatment. Axles and other machine-shop products have moved westward, through the small parts department, thence northward into the landing gear department. Following assembly there, the landing gear is placed aboard the conveyor to be carried to the dope room. From the dope room it is taken, via the conveyor, southward and westward to the engine and landing gear installation department at the northern end of the north-south bay. Small parts also have moved northwestward into the control surface department. Following the welding operation there the surface frames are carried to the dope room, then returned to the control surface covering department to be covered.

The wing covering department, it will be recalled, was where we left the skeleton wings. These have been covered, taken to the dope room for doping and coloring, and returned to the opposite side of the central bay, where they are stored, preparatory to being moved just a few steps westward to the final assembly department.



The large and well-equipped machine shop in the new Stinson plant

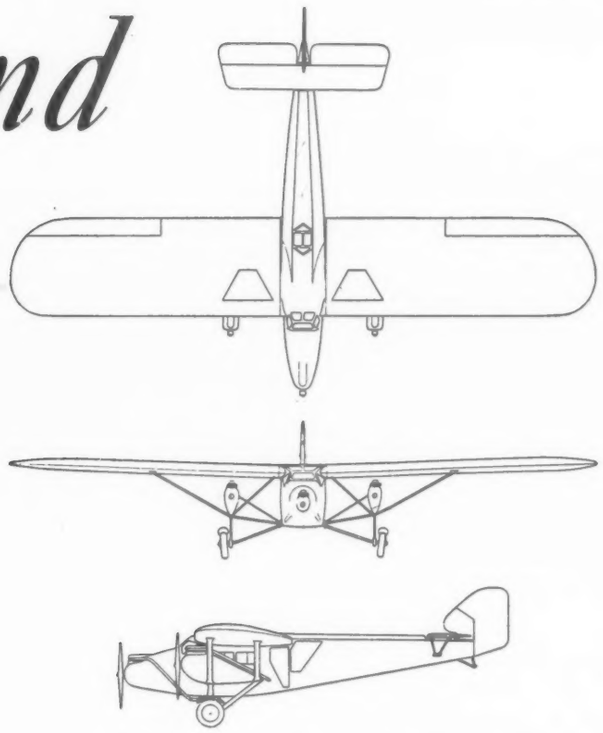
Return for a moment to the fuselage covering and trimming department, where we last left our fuselage after varnish had been applied to its woodwork. By now the fuselage has been covered, the instruments installed, and the cowling adjusted. It then must make a third, and final trip into the dope room, from where it returns to the engine installation department. There, while it is on the bend in the "L," the engine, propeller, and landing gear is installed, after which it starts down the "home stretch" of the production line. As it moves southward, along the western end of the central bay, the wings and control surfaces are picked up and attached. The completed plane is then rigged, given a final inspection, and wheeled onto the field. Just outside the 80-ft. door it is gassed by means of a modern electrical gasoline pumping unit, fed by a 1,000-gal. reserve filtering tank. The filtering tank, in turn, is fed by a 15,000-gal. above ground tank, located at the rear of the plant, 400 ft. away, between the southeast corner of the building and the out structure housing the acetylene gas generating unit.

For purposes of clarity in description the writer has synchronized the various production moves to suit himself. However, the movement is synchronized to make for a minimum of stoppage along any part of the different progressing lines.

Because of the possible percentage of production increase, already mentioned, the Stinson plant, at the present time, is likened to an airplane throttled down, and with plenty of reserve power and speed at the directors' finger tips. And this throttled-down state, according to William A. Mara, secretary of Stinson Aircraft Corporation, is not due to any shortage of orders, but is due to the fact that the company is now equipped with a high powered vehicle instead of a low powered one.

The new factory plan, in fact, it was said, is based upon a production schedule of 1,000 airplanes during 1929, whereas approximately 100 were produced in 1928. With actual production already increased and operating personnel already decreased; with working hours shortened and working conditions brightened, the planning department's calculations seem to be bearing fruit.

THE *Westland* FOUR



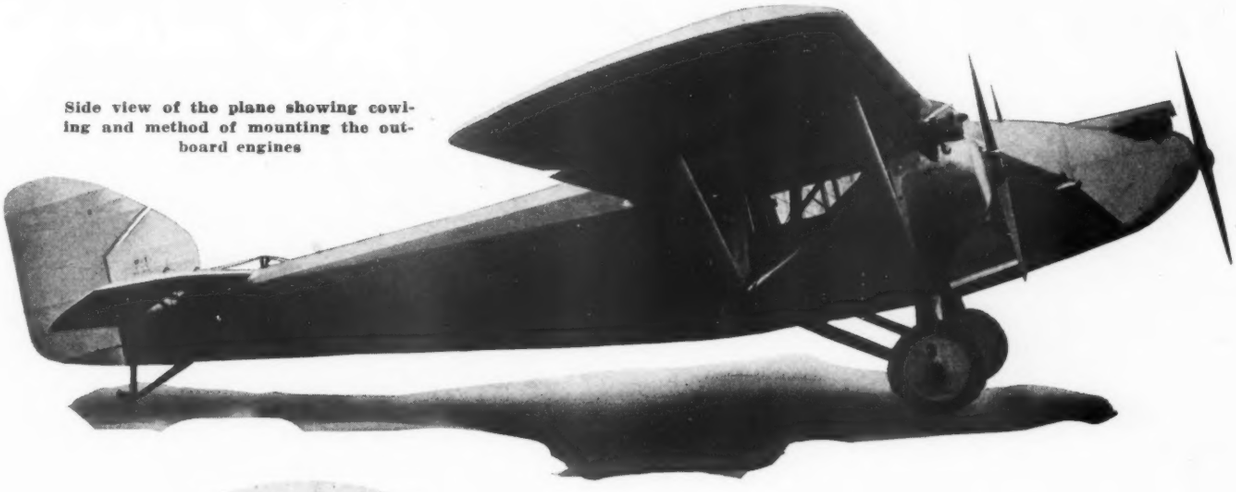
A three view line drawing of the Westland Four

A DESIGN TREND toward the medium weight, multi-engined commercial airplane in England is indicated by the development of the Westland Four, high wing, cabin monoplane powered with three Cirrus Mark III engines, each rated at 85-95 hp. Other power plants in the same range can be provided, and the second of these planes will be powered by three of the new Cirrus Hermes engines, each of which are rated at 105 hp. This plane is a development of the Westland Aircraft Works, Yeovil, England.

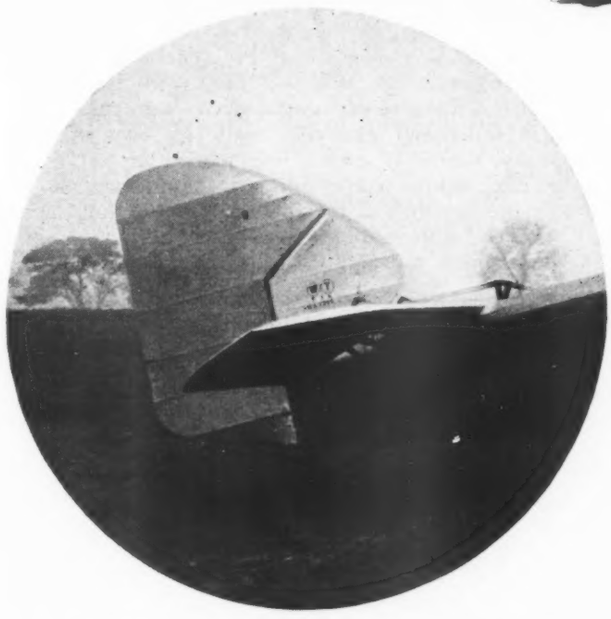
The Westland Four has a wing span of 57 ft. 7 in. and a length of 137 ft. 6 in. The chord is 9 ft. 6 in., and the wing area 490 sq.ft. The weight of the plane empty is 3,090 lb., the payload 880 lb., and the gross weight loaded 4,900 lb. The high speed is 115 m.p.h., the cruising speed 95 m.p.h.

Above: Photograph showing the installation of the Cirrus engines in the Westland Four. Below: A front quarter view of the airplane

The first plane is built of wood and metal construction. An R.A.F. 34 airfoil section, which has very small center of pressure travel, is employed in the wing which is built up of spruce box spars and ribs having three-ply gussets. Double tie rods are used in the drag bracing to provide the necessary torsional strength to the deep wing section. Two gasoline tanks, each having a capacity of 48 gal. are built into the wing roots. These tanks are of tinned steel. Ailerons extend over about one-half of the semi-span and are hinged to tubular brackets carried from the rear spar and steadied by the false spar. The ailerons are of metal construction having tubular duralumin spars and flanged aluminum ribs with oval section duralumin boundary tubes. The wing is braced externally by two struts on each side, originating from the front and rear wing spars respectively, and extending to the outrigger of the undercarriage attachment. Outboard engine mountings are also attached at



Side view of the plane showing cowling and method of mounting the outboard engines



A close up of the empennage of the Westland Four showing the various members

this point. The external bracing arrangement permits of a wide landing geared tread.

The engine cooling is designed to reduce drag and provide an easily accessible engine installation. On the inboard side of each engine there is a hinged portion of the cowling which is so arranged that when open it serves as a working platform to enable the mechanic to reach the filler for the gasoline tanks on the top of the wing and to provide easy access to the power plant.

The fuselage of the first plane is of composite construction, but it is probable that the wood will be replaced by metal in the production models.

On all except the first experimental model, the landing gear is of the oleo and spring type and brakes are provided. Jacking blocks and mud guards are furnished for the wheels. The tail skid is of simple construction and the shoe is an easily renewed chilled iron casting of ample area and shape determined after extensive experimentation. The tailskid shock absorber unit is a damped compression spring mounted with telescopic steel tubes below the tailpost. The cabin, which has a capacity of 143 cu.ft., and ample headroom for a person of average stature, is double-walled to reduce engine noises. Two light luggage racks are arranged above the windows, which extend along each side at a convenient height. The windows are of safety glass and can be easily opened and closed. The seats are of welded steel tube construction, two facing forward and two facing backward, and have well padded cushions. All seats can be moved in a short time when it is desired to use the cabin for freight.

The pilot's compartment is entered through a door from the cabin and is glazed in the front and sides. A hinged, glazed roof is provided which can be opened quickly from within to facilitate egress. A baggage locker having a capacity of 14.5 cu.ft. is located below the pilot's compartment. Access to this locker is obtained through a door in the starboard side of the plane. The pilot's seat on the left side is adjustable and another seat can be provided in the pilot's compartment for a relief pilot or extra passenger. Control is of the wheel type, with adjustable rudder pedals acting on a steel tubular bar. Dual control will be provided on all production models. A stabilizer adjustment is located at the left of the pilot. The usual flying and engine instruments are located on the inclined instrument board.

The specifications according to the manufacturer are as follows:

Wing span	57 ft. 7 in.
Length	37 ft. 6 in.
Chord	9 ft. 6 in.
Wing area	490 sq.ft.
Landing gear tread	15 ft.
Weight empty	3,090 lb.
Pay load	880 lb.
Gross weight loaded	4,900 lb.
High speed (Cirrus III)	115 m.p.h.
Cruising speed (Cirrus III)	95 m.p.h.
Cruising speed (Cirrus Hermes)	100 m.p.h.
Rate of climb at ground	640 ft. per min.
Gliding angle on one engine	1 in 38
Wing loading	10-12 lb. per sq.ft.
Power loading (Cirrus III)	18.5 lb. per sq.ft.
Power loading (Cirrus Hermes)	17.5 lb. per sq.ft.
Fuel capacity	96 gal.
Duration at cruising speed (Cirrus III)	6 hr.
Duration (cruising speed, Hermes)	5¼ hr.

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THE PROBLEM OF *Engine Fuel* REQUIREMENTS

THE WORST grade of fuel with which an airplane engine will operate satisfactorily is a matter of great importance. Nearly all British and European airplane engines require fuel of excellent anti-knock characteristics as well as good volatility, as do most high-powered American engines.

Until the past year or so, there were only a few makes of American aircraft engines in wide use. Of these, only the high-powered ones required special care as to the anti-knock value of the fuel used. Now, however, with two score or more aircraft engines on the American market, the question of their fuel requirements is becoming more and more prominent.

The recent endurance flight by Martin Jensen, in which he used a motor (automobile) gasoline, has focused attention on the possibility of the regular use of motor gasoline in aviation engines. This being so, it is highly desirable to consider the whole question of aircraft engine fuels.

The properties of a volatile liquid fuel which determine its value for use in an internal combustion engine are:

(a) Tendency to detonate (anti-knock quality).
(b) Latent heat.
(c) Volatility.
(d) Calorific value of the fuel.
(e) Heat value of the mixture.

Of these variables, latent heat is, with volatility, a determinant of the density of the charge entering an engine cylinder. Since latent heat varies only slightly among the different classes of volatile liquid fuels, it is of relative unimportance. The same is true of the heat value of the air-fuel mixture and of the calorific value of the fuel. The two properties of a volatile liquid fuel with which we are primarily concerned are its volatility and its tendency to detonate.

The volatility of the fuel is controlled by the refiner. The distillation curves for various grades of gasoline are, in general, in accordance with the Federal Fuel Specifications. Motor gasoline, for instance, has a maximum allowable initial boiling point of 131 deg. F., and a maximum allowable end point of 437 deg. F. Domestic aviation gasoline, on the other hand, has a maximum allowable initial boiling point of around 110 deg. F. and a maximum allowable end point of 374 deg. F. These differences in volatility are all in favor of the aviation gasoline.

The volatility of a fuel affects engine operation in several ways. The mean volatility determines the amount of preheating required to give reasonably uniform distribution, and is a measure of the general utility of a fuel. The percentage of high boiling point fractions in the fuel is a measure of its tendency to condense on the cylinder walls and gradually work its way into the crankcase, where it dilutes the lubricating oil. The higher the boiling temperature of these fractions, the greater the tendency of the fuel to dilute the lubricating oil. The percentage of low boiling point fractions in a fuel determines the ability of the fuel to start a cold engine.

THE VOLATILITY characteristics of a fuel are determined by distilling a 100 c.c. sample of the fuel: measuring the percentage which vaporizes, passes out of the still, condenses and is caught in a graduated glass at various temperatures. The Federal Specifications for Domestic Aviation Gasoline call for the determination of the temperature at which 5, 50, 90 and 100 per cent of the volatiles in the sample have distilled over. We have seen in the preceding paragraph that these boiling temperatures are all of particular interest. The 5 per cent temperature determines the suitability of the fuel for starting a cold engine. The 50 per cent temperature determines the mean volatility of the fuel; this is a measure of the ease of distribution of the fuel to the cylinders, and of the amount of heat that must be applied to the fuel to insure uniform distribution. The 90 per cent point determines the relative amount of crankcase dilution that can be expected. The end point determines the temperature of the volatile fractions which have the highest boiling point. The end point is not of any particular importance, except that it is a measure of the temperature beyond which the fuel is non-volatile. The percentage of non-volatile fractions in the fuel must not exceed four per cent.

The Federal Specifications for so-called Fighting Grade Gasoline and for U. S. Government Motor Gasoline also cover in a similar manner the volatility characteristics required by fuels of this type. Fighting Grade Gasoline is a fuel of superior volatility characteristics to Domestic Aviation Gasoline, and Motor Gasoline has worse (higher temperature range) characteristics. The specifications for U. S. Motor Gasoline cover the gasoline used by the Government as a fuel for automobiles, motor boats, etc., and these same specifications have been adopted by many of the States. All aircraft engines

A Discussion of the Characteristics of Aircraft Fuels and the Important Part They Play in Efficient and Economic Operation

By James M. Shoemaker
Lieutenant Commander, U. S. Navy

designed and built in the United States contemplate the use of Domestic Aviation Gasoline. For this reason the Fighting Grade Gasoline specification is rarely used in this country.

The tendency to detonate of a volatile liquid fuel is not covered by present Federal Specifications. The main reason why this important characteristic of a liquid fuel has not been covered by specification is that it has been very difficult to set up a simple laboratory test for the determination of tendency of a fuel to detonate. Several series of comparative tests have been made, in which various laboratories have tested identical samples of fuel, and the results of these tests have been somewhat inconsistent.

The detonation tendency of gasoline mainly depends on the hydrocarbons which make up the crude oil from which the fuel is distilled. The hydrocarbon fractions of crude petroleum which are of particular interest as gasoline engine fuels are the Paraffins, the Naphthenes and the Aromatics in straight-run gasolines, and the Olefines in the "cracked" gasolines. Of these hydrocarbons, the highest in anti-knock quality are the Aromatics, followed by the Naphthenes, the Olefines and the Paraffins.

The anti-knock quality of a gasoline, or conversely, its tendency to detonate, is to the author's mind the most important quality of a fuel. It directly affects both engine design and engine performance. Detonation in an engine cylinder is a high order explosion of the air-fuel mixture. The difference between ordinary burning of the mixture, and detonation of the same, is paralleled by the difference between the burning of gunpowder and the explosion of dynamite and other high explosives. Detonation in an engine cylinder is caused by the use of too high a compression ratio for the anti-knock quality of the fuel used, with that particular combustion cylinder. Detonation causes the liberation in the cylinder of an excessive amount of heat, and readily raises the temperature of any isolated or partly insulated material in the cylinder combustion space. This local heating gives rise to preignition, due to the charge coming in contact with objects in the cylinder which have been subjected to the intense heat caused by detonation. And preignition, as its name implies, is the ignition of the charge in advance of the designed time of ignition. Preignition immediately results in loss of power, and in greatly increased stress and wear on the engine. In addition to inducing preignition and consequent loss of power, detonation itself causes burning of pistons and valves. It is easily understood, therefore, that detonation in an engine is to be avoided at all costs.

The only means by which detonation may be avoided in an engine is to so design the pistons that the compression ratio of the cylinders will never cause detonation when using the worst fuel (as regards anti-knock quality) with which the engine is expected to run. Hence it is imperative that aircraft engines which are expected to run on any kind of aviation gasoline be designed with a compression ratio which is low enough to handle the worst grade. On the other hand, if the use of aviation gasoline of high anti-knock quality could be insured, full advantage could be taken of it by the use of high compression ratios.

Combustion chamber design is the main determinant of the maximum compression ratio that can be used with any given fuel. In other words, the tendency of a gasoline to detonate in a certain engine may be entirely removed by improvement in the design of the combustion chamber. In any given engine, however, the tendency of a gasoline to detonate is controlled by the compression ratio. The advantages of a high compression ratio are many. In the first place, the higher the compression ratio the cooler will the engine run, provided detonation is avoided. In the second place, the higher the compression ratio the more power will a given engine deliver at the same speed of rotation. And in the third place, this increase of power is accompanied by a reduction in the specific fuel consumption (measured in pounds per brake horsepower per hour) as the compression ratio is increased.

The compression ratio of a gasoline engine cannot be increased beyond a certain limit, even with the most efficient form of combustion chamber. This limit, however, is well above any compression ratio that can be employed with any undoped aviation gasoline without having detonation set in, and is far above the compression ratios now in use in aircraft engines. The highest compression ratio commonly used in American air cooled engines is 5.25 to 1, while that of water cooled engines is about 5.5 to 1. Even these compression ratios require gasoline that is reasonably high in anti-knock quality.

Having discussed briefly the various factors that affect the relative performance of gasolines in an engine, it is appropriate to discuss the present conditions regarding the use of aviation gasoline in this country.

Aircraft engines which are used in interstate air commerce must be certified by the Department of Commerce as being airworthy. This certification takes the form of a Type Certificate, which states that the engine is certified as airworthy at a certain horsepower and speed. The Type Certificate is based on the successful running of the engine through a 50 hr. test, which may be conducted by the Army, the Navy or the Department of Commerce. Nearly all commercial aircraft engines are tested by the Bureau of Standards, which is part of the Department of Commerce. These Bureau of Standards engine tests are conducted in accordance with the Air Commerce Act of 1926, which states that engine tests shall be conducted on fuel and oil furnished by the engine exhibitor, and at Government expense.

To the writer's mind, these regulations covering the Type Certificate test should be reversed; i.e., the exhibitor of the engine should pay the charges, and the Government should furnish the fuel and oil. As conditions now stand, the Type Certificate certifies that the engine has passed a 50 hr. test on fuel furnished by the manufacturer. The certificate rates the engine as being airworthy with fuel of that quality or better; the fuel being checked as to its volatility and anti-knock property by the Bureau of Standards.

This system is the best that can be imposed under the law, but it has two very serious defects. In the first place, there can be no direct comparison between the results obtained (and advertised) with the different engines tested, due to the fact that they are not tested on the same fuel. In the second place, an engine may be tested and certified on a high grade aviation gasoline which may not be generally available for service use. The aircraft engine manufacturer cannot control the conditions under which his engine will be expected to operate satisfactorily. If the reliability of his engine is endangered by the fact that it was developed and tested on better gasoline than is generally available, the reputation and volume of sales of the engine will undoubtedly suffer. In this connection, it is reported that the type test of a certain engine was run on a naphthene base, Fighting Grade gasoline. This engine may, and undoubtedly will, run on gasoline of lower volatility and anti-knock quality, but the Type Test should determine this prior to certification of the engine for use in interstate air commerce.

Country-wide distribution of aviation gasoline with fighting grade volatility and the best possible anti-knock properties cannot be expected. And even if it were available, its price would force aircraft operators to the use of a cheaper gasoline, with probable bad results to the engine.

WHAT IS a possible solution to this problem? A survey of the equipment used in air commerce indicates that aircraft engines are divided into two distinct classes. One class, consisting of engines of 300 hp. or over, is in use in: (a) the military service; (b) air transport lines; and (c) air yachts owned by wealthy corporations or individuals. The other class, consisting of engines under 300 hp., is in general use only in training planes, in sightseeing and air taxi planes, and in privately owned airplanes of all kinds.

The high-powered engines were designed to use gasoline of domestic aviation grade volatility and of good anti-knock characteristics, in order to obtain maximum engine performance; engine performance being of much greater importance than cost of fuel. And the distribution of high anti-knock D.A.G. is adequately covered by the fact that the military services and the air transport companies alike control ground organizations and operate on established air routes where the necessary grade of fuel is always available.

The low-powered engines are in a different status. Engine performance can be sacrificed in favor of low initial cost and low cost of upkeep. Low cost of upkeep calls for cheap and widely distributed fuel. Aircraft engine designers should not, however, be required to design engines that will run on fuel of both poor volatility and low anti-knock quality, such as U. S. Motor Gasoline may be. Better fuel than this has nation-wide distribution at the present time. The volatility characteristics of an aviation engine fuel must be at least as good as that for which the engine was developed. Domestic aviation gasoline is now available at nearly all airports. If D.A.G. volatility is set as a standard, the minimum volatility of aviation gasoline will be a known quantity. This D.A.G. volatility should apply to all engines, high and low-powered alike. All airplane engines can then be developed and tested with the assurance that they will never be expected to operate on gasoline the volatility of which is inferior to D.A.G.

As regards anti-knock specifications, the situation is not the same. The setting up of a high anti-knock requirement for all aviation gasoline will work a hardship on many of the refiners of the various kinds of D.A.G. now available. For the users of low-powered engines, maintenance cost is of extreme importance, and this cost can be cut if any D.A.G., regardless of its anti-knock properties, is satisfactory for engine operation.

THE ABOVE PROPOSALS will be unacceptable to some manufacturers of low-powered engines. They may argue that their engines will never be operated on mediocre fuel, and that they should not be penalized by the requirements that the type test be run on low anti-knock D.A.G. That argument is easily refuted. Let them conform to the suggested fuel requirements for the type test of their engine, and advertise the engine on the basis of the test results. Then, special cases can be prepared for by a type test in which the engine is identical with that previously tested except that it incorporates higher compression pistons commensurate with the improved quality of fuel used.

There should be no difference in the first cost of the low and high compression engines except that entailed by a larger volume of production of one piston design or another. The high compression engine should be advertised as such, and as requiring a special grade of fuel, setting forth as its advantage its higher power for the same weight. Such an engine would be popular on the West Coast, or in regions where the minimum altitude of the landing fields is upwards of two or three thousand feet above sea level.

We believe, however, that the large majority of purchasers of low-powered airplane engines will be content with low-compression engines, for which there is nation-wide distribution of moderate priced fuel which they can use with no danger of engine trouble. And a requirement that the type test be run on relatively low-anti-knock fuel will place all engines on the same basis, will insure safety from fuel trouble, and will be of immense assistance in the conservation of the available supply of domestic aviation gasoline.

The question of using premium automobile gasolines in commercial aircraft engines is one of general interest.

The trouble is that premium automobile gasolines may be high in volatility for ease in cold-weather starting, or high in anti-knock for use in high-compression engines, or both; nothing definite can be determined, however, without testing each particular gasoline. If a motor gasoline is volatile enough to give reasonable distribution, it should cause no trouble, regardless of its anti-knock, in part-throttle engine operation. The high end point of most motor gasolines may cause excessive dilution of the lubricating oil, with consequent lubrication deficiencies.

IT MAY BE interesting to outline the developments in aviation gasoline used in Naval aircraft. The Navy has been held to the Federal fuel specifications in purchases of aviation gasoline. Several years ago, a determined effort to improve the anti-knock quality of the Navy's D.A.G. was started. Experiments were tried wherein various liquids, among them alcohol and benzol, were blended with D.A.G. These were not particularly successful. Alcohol has such a great affinity for water that it picks up moisture rapidly, and the alcohol-water mixture thereupon separates out from the gasoline. Benzol is very effective as a detonation suppressor, but it has the drawback of a freezing temperature only slightly lower than that of water.

The discovery of the efficacy of tetraethyl lead as a detonation suppressor, and the subsequent development of Ethyl Fluid as a "dope" for raising the anti-knock quality of fuel, enabled the Navy to adopt Ethyl Fluid for use with aviation gasoline. The addition of two to three cubic centimeters of Ethyl Fluid per gallon of gasoline made certain that aircooled engines with compression ratios up to 5.25 to 1, and water cooled engines with compression ratios up to 5.5 to 1, could be operated the year around with complete freedom from detonation.

The use of higher concentrations of Ethyl Fluid than two to three cubic centimeters per gallon of gasoline has not been entirely satisfactory, although the Army and Navy have been co-operating with the Ethyl Corporation to eliminate existing difficulties. For this reason, the only means by which the efficiency of Naval aviation engines could be improved seemed to be: (1) to find and adopt a new and better detonation suppressor; or (2) to improve the anti-knock quality of the D.A.G. used by the Navy. Since another detonation suppressor had not yet appeared, it was decided to concentrate on improving the quality of the gasoline.

All the Government agencies are bound by the Federal fuel specifications in the purchase of aviation gasoline, and since the incorporation of an anti-knock test into the Federal specifications for D.A.G. has not been possible, the problem of procuring better gasoline was a difficult one. Comdr. E. E. Wilson, U.S.N., found a solution for the difficulty in 1927 by obtaining an addition to the Federal fuel specification for domestic aviation gasoline, which reads as follows:

> "11. Any military branch may require that samples be submitted for 'approval tests,' in addition to the laboratory tests listed above, prior to the submission of bids or award of contract. These samples shall faithfully represent those which the manufacturer intends to offer in the future under a brand name."

As soon as this provision had been added to the Federal specification, the Bureau of Aeronautics took immediate steps to set up the machinery for the anti-knock testing and rating of fuels. So many differences of opinion existed among oil technologists and automotive engineers regarding the anti-knock testing of gasoline, that the acquisition and setting up of adequate testing equipment, and running of preliminary check tests by the Navy covered a period of over a year. This preliminary work was not completed until January.

Prior to the publication of the 1929 spring schedule of delivery for East Coast gasolines, this Bureau sent some fifty odd refiners a letter informing them that it would be necessary to have their fuels tested before their bids would be considered. In response to this, some 21 gasolines were submitted by 10 different refiners for the required tests, the main feature of which was the determination of the anti-knock value in a Delco testing outfit and detonation tests in a variable compression engine. The average highest useful compression ratio found as a result of these tests was 5.5 to 1, which was therefore established as a minimum datum for domestic aviation gasoline. This standard will enable the Navy to purchase a gasoline capable of use in standard 5.5 to 1 compression ratio water cooled engines without doping. Coincidental with the improved anti-knock qualities was the higher volatility as shown by the average distillation curves. This should result in much better starting properties and a more even distribution. It is believed that these gasolines will reduce the maintenance problem in the field by giving longer engine life between overhauls.

Commencing the first of May, the Navy's D.A.G. is now equal, as regards anti-knock, to the previously-used gasoline—Ethyl Fluid blend. Having improved the quality of the gasoline to the point where Ethyl Fluid or other detonation suppressors need not be added to D.A.G. for service in the existing engines, the next step on the program is to improve the engines to a point where they will require the addition of a detonation suppressor to the new, high—anti-knock gasoline. Sometime within the next year, the Navy hopes that experiments with increased compression ratios, using the new gasoline doped with a detonation suppressor, will reach the point where we can go into general procurement of engines of higher compression ratio. The advantages of increase in compression ratio have been enumerated earlier in this article. The ones of particular interest are increase in power and decrease in specific fuel consumption for the same displacement and speed.

Righting the Wrong

UNFORTUNATELY for all parties concerned, there appeared in the April 27 issue of AVIATION a rather misleading article on the methods of keeping the dope room clean at the Alexander Aircraft factory. The "methods" as described in the article were, as a matter of fact, only experiments conducted by a picked crew of men during "inventory week" when all other work had been suspended. In addition to that, the dope room had not been used for several days and had been thoroughly aired prior to the experiments. The experiments conducted were found to be most impractical and were forthwith abandoned. The Company is continuing to use the same method of dope room cleaning that has been in force for the last three years—that of scraping the dope from the floor . . . *The Editor.*

GENERAL NEWS

Announce Exhibitors List And Events for Air Races

Contest Prizes Total More Than $72,000

CLEVELAND (OHIO)—Cash prizes totalling more than $72,000, in addition to a number of valuable trophies, will be awarded the winners of the air derbies, the closed course races and the various other events that will feature the 1929 National Air Races to be held here August 24 to September 2.

Very nearly half of the prize money will go to those who lead the entrants in the nine derbies into Cleveland. Further details of these races have been announced. The first is the women's event, which will start at Santa Monica, Calif., Sunday, August 18, at 4 p.m. This race, lasting nine days and covering a route 2,650 mi. in length, it is expected, will take the entrants through San Bernardino, Calexico, Phoenix, Tucson, Douglas, El Paso, Pecos, Abilene, Fort Worth, Oklahoma City, Tulsa, Wichita, Kansas City, St. Louis, Terre Haute, Indianapolis, and Columbus to Cleveland. Eight thousand dollars in prizes will be divided among the winners, although there will probably be lap prizes also.

"All-Ohio Derby Race"

The second cross-country event is known as the "All-Ohio Derby Race." This is open to all planes with engines having 275 cu.in. piston displacement or less. The tentative route agreed upon is from Cleveland to Columbus, Portsmouth, Zanesville, Canton and Akron back to Cleveland. The cash prizes will total $1,875. Miami-Miami Beach to Tampa, Jacksonville, Macon, Atlanta, Birmingham, Nashville, Evansville, Louisville and Cincinnati to Cleveland is the probable routing of the planes entered in the Miami-Miami Beach-Cleveland race, which is the third air derby scheduled.

The fourth of the nine derbies is the Philadelphia-Cleveland event. The entrants in this race will probably go from Philadelphia to New York, Boston, Albany, Syracuse, Buffalo, and from there to Cleveland. Another of the air derbies will start from Portland, Ore., and will end, of course, at Cleveland. The starting point for the sixth cross-country event has not been scheduled, although it will be some city on the West Coast. The seventh is the Canadian derby, which it is known will start from Montreal, and will pass through Toronto. However, the rest of the details have not yet been evolved. The eighth race is a non-stop event from some Pacific Coast city to Cleveland, while the ninth is known as the "Rim of Ohio Air Derby." The probable routing of the latter event will take the racers from Cleveland to Dayton, Cincinnati, Chillicothe, Youngstown and return.

Events at Field Varied

The closed course events to be held in Cleveland include races for civilian and military craft of almost every description. The events also include a solo endurance record contest, relay races, efficiency contests, parachute jumping contests, dead stick landing contests, a non-stop and non-refueling airline distance contest to establish a new world's record, and a contest to establish a new high refueling mark. (Details of all events as arranged to date may be obtained from the headquarters at the Hotel Cleveland, Cleveland, Ohio.)

While the preparations for the various racing events are being completed as rapidly as possible, the plans are being carried out for the Aeronautical Exposition, which will be held in the Cleveland Municipal Auditorium and annex in conjunction with the air races.

Industry Shows Interest

The industry already has shown a tremendous amount of interest. This is evidenced by the fact that 130 manufacturers of planes, aircraft engines, and accessories, as well as a number of flying schools and airline operators, have already taken space in the exhibition hall. The space contracted for thus far is well over three-quarters of the 200,000 sq.ft. afforded by the Auditorium, and it is expected that the remaining 50,000 sq.ft. of floor space will soon be taken.

Among the firms that have made contracts for display space in the Cleveland Municipal Auditorium and annex are the following:

Acme Aircraft Corp.; Aero Corporation of America; Aero Supply and Manufacturing Company; Aeromarine Klemm Corporation; Aircraft Safety Devices, Inc.; Alliance Aircraft Corporation; American Eagle Aircraft Corporation; American Cirrus Engines; American Paulin System, Inc.; Associated Aircraft, Inc.; Associated Oil Company; Austin Company; Automotive Industries; Aviation Assurance Agents of America.

Balsa Wood Company; H. W. Beattie and Sons; Bendix Brake Company; Bellanca Aircraft Corporation; Berry

(*Continued on Page 2282*)

Cessna and Travel Air in New Factories

WICHITA (KAN.)—Within a few days Travel Air Manufacturing Company will be turning out 30 planes weekly, divided roughly into ten monoplanes and twenty biplanes. The company now is occupying all units of its improved and greatly expanded factory in East Wichita. The new production program will be launched as soon as all machinery has been installed.

Early in July Travel Air's payroll will be increased to 750 persons, it is said, as compared with 500 at the present time. Both night and day shifts will be operated. Officials of the company say the factory is about seven weeks behind schedule on its orders.

The past week saw the Cessna company moving from its old factory in West Wichita to its new plant of several units southeast of Wichita, near the new Municipal Airport. Plans called for the start of a production schedule in the new factory of two planes daily by June 23. Production at the original Cessna factory had been speeded up to five planes weekly. Within 30 days Cessna officials expect to be turning out four cantilever wing monoplanes daily.

Send Ford to English Display

DETROIT (MICH.)—A Ford-Stout all-metal cabin monoplane has been shipped to England for display during the International Aircraft Exhibition of the Society of British Aircraft Constructors, Olympia, London, July 16-27, it has just been announced. This will be the first time that one of the Ford planes has been exhibited abroad, and the reaction of the British to this type of craft is being awaited with interest. Following the close of the exposition, the plane will be flown extensively in England and other European countries by LeRoy Manning, chief of operations for the Ford airlines and senior test pilot of The Stout Metal Airplane Company, Division of Ford Motor Company. The Ford plane is a Model 5AT, powered with three "Wasp" engines.

Army Awards Large Contracts

WASHINGTON (D. C.)—Contracts for 162 planes to cost a total of $5,000,000 were awarded by the U. S. Army late last week to five aircraft manufacturers. The companies receiving contracts were Curtiss Aeroplane and Motor Company, Inc.; Boeing Airplane Company; Fokker Aircraft Corporation of America, Inc.; Berliner-Joyce Aircraft Corporation; and the Douglas Company.

Alexander to Hold School for Salesmen

COLORADO SPRINGS (COLO.) — Alexander Aircraft Company, manufacturer of the well-known line of Eaglerock planes, will institute a training school for aircraft salesmen at its plant here beginning July 15. The course, which will last 15 days, is to be repeated at the end of each period as long as there is a demand for this type of training.

Only 12 persons will be enrolled at one time. The course is to be given free of charge and is open to all qualified persons, who can give a reasonable assurance that they will enter aircraft sales work after completing their studies. Of course, the representatives of Eaglerock dealers and distributors will be preference over others desiring to enroll.

Salesmanship Reduced to Science

Officials of the aircraft concern believe that they have reduced airplane salesmanship to an exact science as it will be presented in the course. A large part of the material has been placed in text book form for night study, while the construction of aircraft and the various sales points will be taken up in the day classes. Instructors will cover the methods of closing sales under the new Alexander time payment plan in detail, and will also spend some time on two new sales promotion plans that have been evolved. The advantages of using aircraft in the business world likewise will be studied, and from this work it is expected that the students will obtain much valuable material that may be used practically later on.

Justin A. McIaney, vice-president of the Alexander company in charge of sales, is at the head of the salesmen's school. The officials of the firm, factory superintendents and the heads of the various factory departments will deliver the lectures.

"Aristocrats" on Year's Tour

WASHINGTON (D. C.)—Eight stock model "Aristocrat," three-passenger cabin monoplanes, manufactured by General Airplanes Corporation, Buffalo, N. Y., took off from Bolling Field here recently on a 50,000-mi. tour of the United States, Canada, Mexico and Cuba. The planes are being piloted by Army aviators, who have been granted leaves of absence from the service. The Aristocrat fleet left the Buffalo Airport, June 15, and flew to Akron, O., where they were turned over to General Tire and Rubber Company, which is sponsoring the tour. From Akron, the planes flew to Washington where the "flagship" of the fleet was christened.

Stearman Votes Stock Split

WICHITA (KAN.)—Directors of the Stearman Aircraft company have been empowered to issue five shares of stock for each share out at the present time. The company now has a capitalization of 100,000 shares of common stock.

To Triple Russell Facilities

SAN DIEGO (CALIF.) — Facilities of the Russell Parachute Company will be tripled at once in order to meet the demand for parachutes, according to the announcement of H. R. McClintock, president, upon his return to San Diego from a tour of leading aerial centers of the country. Production now is approximately 200 parachutes per month. To regulations recently established by the Department of Commerce, requiring all pilots testing new planes to carry parachutes, and the rapid expansion of mail and freight routes, are attributed the increased demand.

M. I. T. Will Use Airship in Research

BOSTON (MASS.)—The "Mayflower," one of the fleet of four non-rigid airships owned and operated by Goodyear-Zeppelin Corporation, Akron, O., has been placed at the disposal of Massachusetts Institute of Technology for the summer as an aid in the research work to be conducted by the school in communication, meteorology, and aerial navigation in fog, it has just been announced.

Studies in navigation through fog and short-wave radio communication were started at the Institute's research station on the estate of Col. E. H. R. Green, South Dartmouth, Mass., several years ago. This summer, the facilities for conducting this work have been increased. A larger research staff has been engaged and the scope of the studies has been enlarged.

Arrival of the "Mayflower" is expected to further advance the fundamental investigations in which electrical engineers, physicists and meteorologists of Massachusetts Institute of Technology have united, not only in seeking new knowledge, but to train men in this field of science. The airship is being loaned to the school through the courtesy of Paul W. Litchfield, president of the Goodyear company and also of the Technology Alumni Association.

In anticipation of the arrival of the "Mayflower" within a month, erection of an aircraft dock 140 ft. long and 72 ft. wide has been started at Round Hill Airport. The foundations have been completed by F. C. Taylor of New Bedford, and the Austin Company of Cleveland is now building a steel frame and sheet metal aircraft dock, which will be the home of the "Mayflower."

Receive Wright Prizes

NEW YORK (N. Y.)—Three students in the Daniel Guggenheim School of Aeronautics, New York University, last week received the first prizes for airplane designs to be awarded by Wright Aeronautical Corporation. The winning designs were all for high wing monoplanes, built around one of the Wright engines. August Zinsser, Jr., won the first prize of $200; C. H. Schowalter, the second of $125, and Wellwood E. Beall, the third prize of $75.

St. Louis Group To Handle Securities

Form $3,500,000 Investment Trust

ST. LOUIS (MO.) — The St. Louis Aviation Corporation, a $3,500,000 investment trust, has been organized with headquarters here to deal in aviation securities and aid in developing commercial aviation. The company, a Delaware corporation, will have full access to the research department of the National Aviation Corporation.

Harold M. Bixby, well-known St. Louis aviation figure, has resigned as vice-president of The State National Bank to head the new organization. Phil DeC. Ball, president of Mahoney-Ryan Aircraft Corp., is chairman of the Technical Committee, which also includes Phillip R. Love, Russell Nicholas, president of Nicholas-Beazley; Oliver Parks, operating head of the Parks enterprises; Maj. William B. Robertson, president of Curtiss-Robertson; and Maj. Thomas G. Lamphier, who was formerly commander of the First Pursuit Squadron, U. S. Army, and is now identified with Transcontinental Air Transport.

Board Includes Many Notables

The Board of Directors comprises many local and out-of-town leaders and pioneers in commercial aviation, including C. M. Keys, J. Cheever Cowdin, Earle H. Reynolds, Richard F. Hoyt, William H. Bixby, Mark C. Steinberg, Walter S. Marvin, John A. Prescott, L. Wade Childress, Russell E. Gardner, Morgan Belmont, Leonard Kennedy, James Noyes, and others equally as well-known.

Thomas N. Dysart is chairman of the Executive Committee through which the Board of Directors will function in charge of operations. Others on this committee are: Oliver H. Anderson, Harry Hall Knight, James C. Willson and Mr. Bixby, the president of the new concern.

The company has an authorized capitalization of 500,000 shares of no par value common stock, of which 150,000 shares are outstanding. Based on the subscription price of $23.50 a share, the latter represents $3,525,000. The stock is expected to be listed on the Curb Market.

Cite Purposes of Concern

The purpose of the new company is given as follows: "To acquire, buy, hold, sell and trade in securities of aviation companies; to deal in aviation securities to the end that it may acquire for more or less permanent investment securities of those companies which in the judgment of the management seem to have prospects of becoming leaders in their respective fields; to develop such new aviation projects as in the opinion of its technical advisers merit assistance and in general to further the development of commercial aviation. It is not limited, however, to aviation investments exclusively."

Rand-McNally Has New Airways Map

U. S. System Drawn On Conic Projection

CHICAGO (ILL.) — Rand McNally & Company, has announced publication of a new airways map of the United States, It is a wall map measuring 42 x 28 in. on a scale of 80 mi. to the inch, printed in six colors, showing state and international boundaries, the principal cities, rivers and lakes, and the mountains. Established air routes and lines of equal magnetic variation are shown in red. Mileage distance circles are drawn at 500-mi. intervals around the point at which the map is to be used.

The map is drawn on a conic projection based on two standard parallels, which makes is possible to measure airline distances and directions directly from the map with practical accuracy.

Town Index for Each Map

Accompanying each map is an index booklet which lists and locates towns on the map and gives the population of each. A comprehensive article on the elements of Practical Air Navigation is also included in the booklet. The article covers the instruments of navigation, the plotting of the course, the use of the compass in connection with the map, tables for correction of magnetic course according to wind velocity, time and distance chart, a number of practical navigational problems which are explained and solved, extracts from the Department of Commerce air traffic rules, and an explanation of the aids to navigation, such as lights and radio beacons.

The map is available in several different mountings including cloth and board for use as a wall map, and may be obtained in sheet form for use on a desk or table under glass.

Special air map folders have recently been completed by the company, for Northwest Airways, Inc., operating service between this city and St. Paul and Minneapolis, Minn., and for Curtiss Air Line, offering Sikorsky service between New York and Atlantic City. Information and pictures complete the folders, which are especially designed for distribution among passengers.

Doolittle to Tour South America

WASHINGTON (D. C.)—Lieut. James H. Doolittle, U. S. A., will make a flight through Cuba, Panama, Colombia. Ecuador, Peru, Chile, Bolivia and Argentina this summer for the purpose of charting a new air mail route, to study flying conditions and to demonstrate American aviation equipment, it was learned here recently when the War Department granted him permission to make the tour. Lieutenant Doolittle expects to be gone from July 15 to August 15. He will fly a P1-C standard Army pursuit plane now being prepared for the trip at Mitchel Field, L. I.

Pan American-Grace Buys Fords

NEW YORK (N. Y.)—Pan American-Grace Airways, Inc., has purchased five new Ford-Stout monoplanes, powered with Pratt & Whitney "Wasp" engines, for use on the mail and passenger line operated by the company from Talara, Peru, to Santaigo, Chile, it has just been announced. The planes are being ferried from the Ford plant at Dearborn, Mich., to Roosevelt Field, L. I., N. Y., where they will be disassembled for shipment aboard freighters of the Grace line to Callao, Peru. From there, the planes will be trucked to Lima, where they will be reassembled.

Seek Spanish Flyers Attempting Atlantic Hop

NEW YORK (N. Y.)—As AVIATION goes to press the fate of the Spanish flyers, who left Cartagena, Spain, Friday, June 21, on an attempt to fly to this country by way of the Azores, had not been determined. Government and private ships were searching for Maj. Ramon Franco, Maj. Arturo Gallarza, Capt. Ruiz de Alda and Sergt. Pedro Madariaga with only uncertain reports of flares and drifting airplane wreckage being sighted to spur them on.

The men were flying a Dornier Wal, powered with two Hispano-Suiza engines of 600 hp. each. Some delay in starting the search was caused by the erroneous report that the fliers had landed in one of the outlying harbors of the Azores. Anxiety over their safety developed rapidly when this was found to be a mistake. Major Franco and Captain de Alda flew to South America in 1926.

Announce Glendale School

LOS ANGELES (CALIF.)—Announcement that an aviation school to be known as the Pacific College of Aeronautics and Engineering, Inc., is to be established at the Grand Central Air Terminal, Glendale, has just been made by W. P. Montgomery, secretary and general manager of the institution. Hangars, an administration building, a machine shop, a research laboratory, a wind tunnel and equipment, a gymnasium, a mess hall and dormitories, will be erected on a large tract of land that has been leased, 600 ft. of which border the landing field. The curriculum of the school is said to conform to the Army training system. There will be a ground school, flying school and engineering and design classes.

License Eagle Planes at Plant

KANSAS CITY (MO.)—American Eagle plane purchasers, it is announced here, may now obtain Federal licenses on their craft before taking delivery on them at the factory here. W. E. Phelan, Government inspector, is on duty at the firm's Fairfax Airport plant and inspects and licenses machines. Licenses, however, are not granted at the factory on planes sold less engines.

Brunner-Winkle In Guggenheim Test

MITCHEL FIELD (L. I.)—The official test of the entries in the Guggenheim safe aircraft competition got under way here June 19. The first plane to be tested is a Brunner-Winkle of the prevailing type of three-place open cockpit plane. The actual tests will take several weeks and the events of the first day were confined to official announcements and flights by various members of the Guggenheim staff. The test pilots were to familiarize themselves with the machine and then proceed with the tests.

Points for the first four tests will be distributed as follows:

	Maximum Number of Points Obtainable
1. Speed Tests	
(a) Two points for every m.p.h. less than 35 m.p.h. at which level controlled flight can be maintained	10
(b) Four points for every m.p.h. less than 38 m.p.h. which is not exceeded in a steady controlled glide during a period of 3 minutes	24
(c) Any aircraft which obtains a combined total of at least 24 points under tests (a) and (b) will be eligible to receive points for high speed in excess of 110 m.p.h. as follows: One point for every 2 m.p.h. in excess of 110 m.p.h. at which level flight can be maintained	10
2. Test of Landing Run Two points for every 3 ft. less than 100 ft. in coming to rest after first touching ground	40
3. Test of Landing in Confined Space One point for every 2 ft. less than 300 ft. from the base of an obstruction 35 ft. high in coming to rest after gliding in over the obstruction	75
4. Test of Take-Off One point for every 15 ft. less than 300 ft. required to take off from standing start	15
One point for every 10 ft. less than 500 ft. to clear obstruction 35 ft. high from a standing start	26
	200

Army Testing Plane Built for Safety Contest

CLEVELAND (OHIO) — Cleveland's entry in the Guggenheim safe aircraft competition is being tested by the Air Corps at Wright Field. It is a single passenger cabin monoplane with a flap arrangement. The ship also has a high tail and stabilizer slots which act in the opposite manner of the Handley Page slotted wing in establishing equilibrium. The little slots are located on the front of the wing and open automatically when the plane is out of balance, reducing the lift on the high side. The plane is powered by a Warner engine. It was built here by Heraclio Alfaro, head of the department of aeronautics at Cleveland College. He has been working on it for over a year.

New Sikorsky for Oil Firm

NEW ORLEANS (LA.)—One of the latest type Sikorsky amphibians has been brought here by Pan-American Petroleum Corporation.

Great Lakes Starts Shop Training Classes

CLEVELAND (OHIO) — Training courses for office and shop supervisors, including foremen, sub-foremen and others, have been instituted by Great Lakes Aircraft Corporation, according to Col. Benjamin F. Castle, president of the airplane manufacturing company.

"Development of business from a financial and technical standpoint is far in advance of the development of the ordinary workman," Colonel Castle said, in explanation of the action taken by his company. "As a result, the average manufacturing concern fails to realize the full capacity of its equipment. All jobs make certain definite demands on workers for a reasonable amount of knowledge and skill. Any worker whose qualifications do not meet these demands is laboring under a handicap and is therefore in need of some vocational training."

The present course is being conducted by Prof. C. W. Hall of the Collinwood High School, this city. Classes for foremen and sub-foremen are being held in the company's offices from 10:30 to 11:30 in the morning three times a week. The object of this preliminary course is to study the art of teaching as applied to vocational subjects so that more effective training of workmen may be accomplished.

Navy Testing Seven Types

WASHINGTON (D. C.)—Seven new types of planes, which it is believed will show much greater load carrying capacities and speed than those in service today, are known to be either awaiting test or are being tested at the Naval Air Station, Anacostia, D. C. These planes include a new Boeing pursuit; two-seated fighters produced by both Curtiss Aeroplane & Motor Company, Inc., and Chance Vought Corporation; a Martin "diving bomber"; a Ford transport, powered with the new Wright 300 hp. engines of the J-6 type; a Consolidated flying boat, and a flying boat constructed at the Naval Aircraft Factory, Philadelphia.

Fairchild Holds Celebration

FARMINGDALE (L. I.)—The three hundredth Fairchild-made plane took off from Fairchild Airport here, recently and in two hours and a half flew to Hagerstown, Md. There it was met by the three hundredth plane turned out by the Hagerstown plant. Officials of the company and the city joined in a celebration which included dedication of the Fairchild "KR" field as the Hagerstown Municipal Airport.

Start St. Louis Thrush Plant

ST. LOUIS (MO.)—Work has been started at Lambert-St. Louis Field on the new Thrush factory of the Curtiss-Robertson Airplane Manufacturing Company and will be completed in several months.

Form Air Propellers, Inc.

HAGERSTOWN (MD.)—Air Propellers, Inc., has been organized here by John Squires, president of the Kreider-Reisner Aircraft Corporation. Wood and metal propellers will be manufactured, it is said, under patents held by Squires. The new company will have no connection with the Kreider-Reisner or Fairchild groups and its product will be sold in the open market. The issuance of 1,000 shares of common no par value stock has been authorized. The incorporators are Mr. Squires, Edwin Smead and Leo H. Miller. Howard Baker, of Washington, D. C., will be on the board of directors.

Committee Named To Study Sprinklers

WASHINGTON (D. C.)—Col. Harry H. Blee, chief of the Division of Airports and Aeronautic Information, Bureau of Aeronautics, Department of Commerce, has been appointed the chairman of a committee to arrange and conduct tests on automatic sprinklers to determine their effectiveness in extinguishing hangar fires.

Other members of the committee are, W. S. Garland, Bureau of Aeronautics, Navy Department; R. W. Hendricks, Underwriters' Laboratories; Ira G. Hoagland, National Automatic Sprinkler Association; Maj. Frank M. Kennedy, U. S. Army Air Corp.; W. Laurence LePage, Aeronautical Chamber of Commerce of America, Inc.; N. D. Mitchell, Bureau of Standards; H. E. Newell, National Board of Fire Underwriters, and Starr Truscott, National Advisory Committee for Aeronautics.

The Bureau of Standards has agreed to furnish the personnel and instruments necessary for the proper recording of the results of these tests, which will be open to the public. The formation of the committee is the result of three conferences held at the request of the National Board of Fire Underwriters to discuss the proposed code for airports. At all three of the conferences, the representatives of the aeronautic industry objected to the requirements concerning automatic sprinklers. The appointment of the committee for conducting tests of the fire fighting equipment was the result.

Moreland in New Factory

LOS ANGELES (CALIF.)—The new Moreland Aircraft Company factory at Mines Field, Los Angeles, has been completed and equipped with special jigs and tools throughout. Production has been started on two planes, one a de luxe three-place cabin monoplane to be powered with the 300 hp. Wright J-6, and the other a two-place open training plane to be powered with a 60 or 90 hp. LeBlond. Material is on hand at the factory for a lot of 30 planes and it is planned to institute a production schedule of a plane per day as quickly as the type certificate is granted.

Ohio Operators Form Aero Chamber Unit

CLEVELAND (OHIO) — Another group of aircraft distributors and dealers have organized under the banner of the Aeronautical Chamber of Commerce. The latest link in the nation-wide chain is the Northern Ohio unit. Clifford Gildersleeve, of United States Air Lines, was elected chairman until September. H. W. Maxson of Air Service, Inc., Akron, Ohio, was appointed chairman of the committee on relations with manufacturers. Bert E. Smith of Ohio Lockheed Sales Corporation, Akron, was selected to head the committee on relations with the public, with H. R. Reitz of Stewart Aircraft Corporation, Cleveland, and B. E. Fulton, manager of the Akron Municipal Airport as members.

The committee on relations with the Department of Commerce will be headed by Louis G. Meister of the Curtiss Flying Service of Ohio. P. A. Wright of Thompson Aeronautical Corporation was appointed chairman of the committee on internal problems.

The 18 aircraft dealers and distributors now in the new section are: Airways, Inc., Akron; Air Service, Inc., Akron; Akron Air Lines, Fulton Field, Akron; Cleveland Airport Service, Inc., Cleveland; Cleveland Institute of Aviation, Cleveland; Curtiss Flying Service, Cleveland; Dungan Airways, Cleveland; Ohio Air Transport, Youngstown; Ohio Lockheed Sales Corporation, Akron; Robbins Flying Service, Akron; Stewart Aircraft Corporation, Cleveland; Thompson Aeronautical Corporation, Cleveland; United States Air Lines, Cleveland; Parker Brothers Airways, Sandusky; Floyd J. Logan Company, Cleveland; Skyways, Inc., Cleveland; Lorain Airway Service, Inc., Lorain; Reliance Air Transport Company, Youngstown.

Set Boston Show Dates

BOSTON (MASS.) — The week of September 23-28 has been definitely announced as the time for the Fourth Annual New England Aviation Exposition. It will be held at the Boston Garden under the direction of Sheldon Fairbanks and in direct charge of Daniel Rochford. Exhibitors already entered include the Pratt & Whitney Aircraft Company, the American Moth Aircraft Corporation, Whittelsey Manufacturing Company, the American Aeronautical Corporation and Keystone Aircraft Company. The new Skyways flying boat and the Grandville biplane, both local products, also will be shown.

Posters Urge Social Air Mail

WASHINGTON, (D. C.)—Several different types of posters have been designed by the Post Office Department advertising that air mail now is considered socially correct. Development of this source of air mail followed discovery that mail of a strictly social character was being sent by plane in increasing quantities.

Emsco "Challenger" On West Coast Tour

LONG BEACH (CALIF.) — Favorable test flights of the Emsco "Challenger" tri-engined, eight-place, cabin monoplane, the first of its type to be manufactured by the Emsco Aircraft Company, have been made at the local Municipal Airport. After the tests the plane, piloted by Jack Reid, chief test pilot of the Emsco Aircraft Company, and co-pilot, Charles Rocheville, chief designer, with E. M. Smith, president of various Emsco companies, William Williams, sales manager for the Aircraft Corporation, and W. A. Trout, vice-president, as passenger, was started on a tour of the Pacific Coast.

The tour was made primarily for business purposes, but every opportunity was sought to fly the plane from poor fields and at various altitudes as a test of its performance in actual commercial operation.

The Emsco Steel and Equipment Company has purchased this plane and soon will send it on a tour of about 12,000 mi., conducted by W. A. Trout, who will visit all Emsco representatives in Canada and the United States. Following this tour Mr. Trout will use the plane for his own transportation needs, two others of like construction having been ordered for the use of other Emsco officials.

Montreal-Detroit Mail To Be Started July 15

WASHINGTON (D. C.)—Air mail service between Montreal and Detroit will be started July 15, it has been announced by Assistant Postmaster General Glover. The schedule for the service has been announced as follows:

Leave Montreal 9:15 a.m., arrive Toronto 12:30 p.m. Leave Toronto 12:45 p.m., arrive Hamilton 1:15 p.m. Leave Hamilton 1:30 p.m., arrive London 2:15 p.m. Leave London 2:30 p.m., arrive Windsor 3:30 p.m. Leave Windsor 3:45 p.m., arrive Detroit 4 p.m. Leave Detroit, 5:15 a.m., arrive Windsor 5:25 a.m. Leave Windsor 5:35 a.m., arrive London 6:30 a.m. Leave London 6:50 a.m., arrive Hamilton 7:30 a.m. Leave Hamilton 7:40 a.m., arrive Toronto 8 a.m. Leave Toronto 8:30 a.m., arrive Montreal 11:30 a.m.

Canton to Hold Show July 4-7

CANTON (OHIO) — American Legion Post No. 44 announces the Air Derby and Aviation Show here, July 4-7. Manufacturers wishing to display their products should address inquiries to show headquarters, Room 208, 318 Cleveland Avenue, N. W. Lee Sherrick. Stout pilot, will be home to assume charge of the air program; R. M. Edwards is acting as director general.

Warner to Head S.A.E.

SARANAC LAKE (N. Y.)—Edward P. Warner, former assistant secretary of the Navy for Aeronautics, and recently appointed editor of AVIATION, has received the nomination as president of the Society of Automotive Engineers. Mr. Warner's name was presented at the airship section meeting.

G.L.A.C. in National Tour

CHICAGO (ILL.)—Great Lakes Aircraft Corporation announces here that it has submitted entry No. 1 for the 1929 National Air Tour, scheduled to be held Oct. 5-21. The machine, Col. Benjamin F. Castle, president, states, is a new type yet to be announced and will be flown by Charles W. Meyers, chief test pilot. Other corporation planes, including the Trainer and 4A-1 amphibion will also make the 3,900 mi. journey entailed by the tour.

New Firms Announced

AIR CRUISERS, INC., 11 West 42nd Street, New York City; capital 10,000 shares now par value stock; J. F. Boyle, president; to deal in aircraft.

TIBBS FLYING SCHOOL, Oklahoma City, Okla.; capital $50,000; by Burrell Tibbs, Harvey Everest, James Brazell and E. Todd Nelson.

AERO PICKUP SERVICE CORPORATION, 551 Fifth Avenue, New York City; capital 1,000 shares no par value stock; by Henry C. Bushmeyer, Archie W. Card, Thomas L. Zimmerman, Jr.; to operate aircraft.

TRANSPORT AIRCRAFT CORPORATION, 47 Wall Street, New York City; capital 200,000 shares no par value stock; Edward Tobay, president; to deal in aircraft.

NEBRASKA FLYING SERVICE, INC., Fremont, Neb.; capital $250,000; to establish an airport and conduct a transport line, flying school, photographic survey and deal in aircraft.

FEDERATED AERONAUTICS, INC., 72 Wall Street, New York City; capital 1,000 shares no par value stock; Frank Vernon, Henry Boswell and Eric F. Waeber; to deal in aircraft.

ALLIED AVIATION EQUIPMENT COMPANY, Detroit, Mich.; capital 1,000,000 shares of no par value stock; by Joseph Leopold and others; to absorb aviation parts and accessory concerns.

NATIONAL AVIATION UNDERWRITERS, INC., Kansas City, Mo.; capital $100,000; by Jules B. Guinotte, H. E. Clark, Jr., Frank G. Altman and Charles M. Singleton; to act as underwriting manager or agent for insurance companies.

HALLET AIRWAYS, INC., Kennewick, Wash.; capital $10,000; by W. E. Hallett and George Hallett; to engage in the air transportation and air school business.

COASTAL PLAINS AIRWAYS, INC., Rocky Mount, N. C.; capital $200,000; by J. W. Hines, M. F. Jones, W. E. Fenner and R. B. Davis.

SOUND AIR TRANSPORT COMPANY, Bellingham, Wash.; by Jack Scott, Tim Healy and William Andrews; to operate a flying service.

FIRST NATIONAL AIRWAYS OF AMERICAS, INC., Los Angeles, Cal.; capital $1,000,000; by Victor D. Gordon, Sidney W. Neighbors, C. E. McClement and others.

More Planes Approved

WASHINGTON, (D. C.) — Two approved type certificates were issued by the Aeronautics Branch, during the week ending June 22, as: No. 164—Fokker Standard Universal, 5PCLM, Wright R-975, 300 hp. No. 165—6-14 Stout 5-AT-C, 17PCLM, 3 Wasps. For week ending June 15, 1929. No. 161, 6-11 Stinson SM-2AB, 4PCLM, Wright J-5, 220 hp., 2169, 1031, 3200; No. 162, 6-11 Kreider-Reisner C-4-C, 3POLB, Wright R-540, 165 hp., 1457, 885, 2342; No. 163, 6-12 Buhl CA3-D, 3PCLB, Wright R-975, 300 hp., 2017, 1183, 3200

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Bros.; E. W. Bliss and Company; Boeing Airplane Company; Boeing Air Transport, Inc.; Bohn Aluminum and Brass Corporation; Robert Bosch Magneto Company; Brunner-Winkle Aircraft Corporation.

Champion Machine and Forging Company; Chance Vought Corporation; Cleveland Pneumatic Tool Company; Cleveland Tool and Supply Company; Crescent Tool Company; Curtiss Flying Service, Inc.

Dayton Airplane Engine Company; Detroit Steel Products Company; DeWalt Products Corporation.

Eastman Aircraft Corporation; Eaton Axle & Spring Company; Eclipse Machine Company; Electric Storage Battery; Ex-Cell-O Tool Company.

Fleischmann Transportation Company; K. G. Frank; Fyr-Fyter Company.

Gates Aircraft Corporation; General Airmotors Company; General Airplanes Corporation; General Tire and Rubber Company; Golden Eagle Aircraft Corporation; Great Lakes Aircraft Corporation; E. Dexter Green; Green Patents Syndicate; Guardian Aircraft Corporation.

Hamilton Aero Manufacturing Company; Haskelite Manufacturing Corporation; Hawthorne Model Aero Company; Heath Airplane Company; Heywood Starter Corporation; Hodkinson Aircraft.

E. L. Inlow; International Flare-Signal Company; International Nickel Company, Inc.

Johnson Airplane and Supply Company; Johnson Company.

Kendall Refining Company; Kinner Airplane & Motor Company; Kreider-Reisner Aircraft, Inc.

E. M. Laird Airplane Company; LeBlond Aircraft Engine Company; Leece-Neville Company; Linde Air Products Company; Floyd J. Logan Aviation Company; Lycoming Manufacturing Company.

McGraw-Hill Publishing Company; Macwhyte Company; The May Company; Moreland Aircraft, Inc.; Moth Aircraft Corporation; Moundsville Airplane Corporation.

National Air Pilots Association; Naturaline Company of America; Nicholas-Beazley Airplane Company; Noran Aircraft Company.

Paragon Engineers, Inc.; Parker Appliance Company; Penna Rubber and Supply Company; Pratt & Whitney Aircraft Company.

Radiomarine Corporation of America; Robbins Flying Service.

Scintilla Magneto Company, Inc.; Showalter Associates; Solar Aircraft Company; South Bend Lathe Company; A. G. Spalding and Bros.; Standard Oil Company of Ohio; Standard Oil Company of Louisiana; Steward Hartshorn Company; Strauss and Buegeleisen; Strong Carlisle and Hammond; Szekely Aircraft and Engine Company.

Ta-Ho-Ma Airplane and Motor Corporation; Texas Company; Thompson Products Company; Travel Air Company; E. S. Twining and Company.

United Air Express; Universal Air Lines System; U. S. Air Compressor Company.

Vacuum Oil Company; Vance Aircraft Company; Verville Aircraft Company; Vichek Tool Company; Geo. D. Wanner and company.

Warner Aircraft Corporation; Western Electric Company; Westinghouse Electric and Manufacturing Company; Willard Storage Battery Company; Wright Aeronautical Corporation; Wyman and Gordon.

PERSONNEL

HAROLD OLSEN has been appointed assistant sales manager of the Minneapolis branch, Universal Aviation Schools.

CARL A. ZEIZER, has joined the pilot staff of the Universal Aviation Corporation at St. Louis. WILLIAM MCKINLEY Solberg, has been appointed instructor.

W. H. COLLINS, formerly of the Bethlehem Ship Building Corporation, has been named superintendent of the Goodyear Zepplin Corporation, Akron, Ohio, as assistant of Dr. Karl Arnstein, vice president.

FRANK H. SCHWEITZER has been appointed manager of the aviation department of Pacific Goodrich Rubber Company, Los Angeles.

CLIFFORD HENDERSON, THEODORE HULL, ALLAN LOUGHEAD, D. W. TOMLINSON, RALPH C. DIGGINS, WALDO WATERMAN, OTTO TIMM, EARL OVINGTON, W. JEFFERSON DAVIS, JOHN BOWERS and LEONARD DAVIS, are on the board of directors of The Flying Club of California at Los Angeles.

JOHN M. VORYS, Columbus, Ohio, attorney, and World war pilot with the Naval Air Service, has been appointed state director of aeronautics.

L. R. MURPHY, formerly of the Ford Motor Company, has been assigned to the Cleveland-Detroit run of the Stout Air Lines.

W. E. PHELAN, Aeronautics Branch inspector, has been assigned to the American Eagle factory at Kansas City.

LIEUT. ROYAL LEONARD has been transferred to the Kansas City-Los Angeles run of Western Air Express.

T. G. STONE of Custer, Mont., has been appointed flying instructor at the Braley School of Flying, Wichita.

LESTER G. ORCUTT is assisting Oliver A. Rosto, Aeronautics Branch inspector, at Wichita, Kan.

CAPT. E. V. RICKENBACKER has been named vice president in charge of sales of the Fokker Aircraft Corporation.

H. F. BROWER has been made manager of the Salina, Kan., Municipal Airport.

J. H. YEAMAN has been appointed head of the sales division and B. A. SLATER has been appointed head of the airport engineering division, of Southern Air Transport.

JULIUS JOHANNPETER, CHARLES ROUSCH, R. D. NEWTON and RAY FORTNER, former Robertson Aircraft Corporation pilots, have been transferred to the new Universal route from Cleveland to Garden City, Kan.

A. S. BROWN, assistant sales manager of the Utah Oil Refining Company, Salt Lake City, has been elected president of the re-organized Sea Gull Air Lines. The directors of the company include P. WHITNEY PARRY, vice president, BEN F. REDMAN, SERGE F. BALLIF, SR., A. L. INGLESBY and V. L. HALLIDAY. FRED PINGREE has been elected secretary-treasurer.

R. N. BERGEN, formerly of the Bergen-Bromley Flying Service, Tacoma, Wash., has been appointed western divisional sales manager International Aircraft Co., Cincinnati, Ohio, for the states of Washington, Oregon, Idaho, California, Nevada, Utah and Arizona.

FRANK DUNN has been named test pilot for the Mahoney-Ryan Aircraft Corporation.

FRANK W. CALDWELL will have charge of engineering work, including research, designing propellers and improving production methods for the Standard Steel Propeller Corporation, Pittsburgh.

M. G. HAVEN, RAY FULLER and ALBERT WOERTER, have been added to the operating staff of the Braniff Division, Universal.

PROF. J. C. DAVIS of the engineering school, University of Oklahoma, has joined the engineering staff of the Coffman Monoplanes, Inc., Oklahoma City.

CAPT. STEPHEN ZAND has assumed his duties as aviation director with the Taylor Instrument Companies, Rochester, N. Y.

C. E. NELSON, Chicago, Ill. has been appointed division sales manager of the International Aircraft Company for the territory of Michigan, Wisconsin, Illinois, Indiana and Ohio.

LIEUT. EDWARD REMBERT, has joined the Great Lakes Aircraft Corporation of Cleveland, as assistant to Col. Benjamin F. Castle, president.

CAPT. HAROLD C. MAJOR, Marine Corps, formerly head of the Information Section of the Navy Bureau of Aeronautics, has been assigned to duty at Langley Field, Va.

AERONAUTICAL CALENDAR

June 27-30	International Light Plane Meet, Amsterdam, Holland.
July 16-27	International Aircraft Exhibition of the Society of British Aircraft Constructors, Olympia, London.
Aug. 24-Sept. 2	National Air Races and Aeronautical Show, Cleveland, Ohio.
Aug. 26-28	Society of Automotive Engineers, Cleveland Aeronautic Meeting.
Sept. 2-7	Class C Aviation Exhibit Rochester Exposition at Rochester, N. Y.
Sept. 6-7	Schneider Cup Race, over the Solen Cowes, England.
Sept. 23-28	Fourth Annual New England Aviation Exposition, Boston Garden, Boston, Mass.
Sept. 28	Gordon Bennett Balloon Trophy Race, St. Louis, Mo.
Oct. 5-21	National Air Tour, Starting from Ford Airport, Dearborn, Mich.
Oct. 12-27	Southwestern Aircraft Exposition, State Fair Grounds, Dallas, Tex.
Nov. 18	Lehigh Airport Design Competition closes. Lehigh Portland Cement Company.
Dec. 1-9	International Aeronautical Exposition of the Aeronautical Chamber of Commerce, Chicago.

TRADE TIPS

It has been reported that

Vancouver, Wash., has appropriated $750 salary for a municipal airport manager for the balance of this year.

A vacancy has been announced for senior mechanical research engineer in the Material Division, Wright Field, Dayton, Ohio, at a salary between $4,600 to $5,200 a year. Application must be filed with the Civil Service Secretary, Cincinnati, not later than July 20.

Aeronautical information is requested by the Aviation Division of the William Penn Motor Club. Several pages of the monthly magazine are to be devoted to aviation news.

The Sound Air Transport Company is planning construction of a hangar near Bellingham, Wash. Tim Healy, of Bellingham National Bank Building, is president of the company.

The Beacon Airways of America, Inc., Board of Trade Building, Kansas City, Mo., is taking bids on construction of first unit of an airplane plant in the Fairfax Industrial District.

Oklahoma City, Okla., is about to vote on bonds for $425,000 for improvements to its airport, to include construction of hangars to cost $47,500.

The Curtiss Flying Service, Inc., is reported to be planning the expenditure of about $25,000, to establish an airport on the Curtiss-Bright land, northwest of Jacksonville, Fla.

The Real Estate Investment Company is about to let contract for construction of 100x400 ft. transient hangar at the Grand Central Air Terminal, Glendale, Cal.

Representatives Named

MONO AIRCRAFT—P. C. Walster & Sons, Binghamton, N. Y., for southern New York.

PRATT & WHITNEY—The Aero Corporation of California. Los Angeles, Calif.; for Southern California, Arizona, New Mexico, and Texas.

PYLE-NATIONAL—Universal Aviation Corporation, St. Louis.

STINSON—North Atlantic Aviation Services, Inc., being organized by J. S. French of Exeter, N. H.; for New England.

Steffens Aircraft Corporation, 96-100 Park Ave., Rutherford, N. J.; for Metropolitan, N. Y. and New Jersey.

AMERICAN EAGLE—Simmons Aircraft Division of Steel, Inc., Los Angeles.

ARISTOCRAT — Air Associates, Inc., New York City; for New York City, much of New York State, Connecticut, New Jersey, Maryland, Delaware and Washington, D. C. and parts of Pennsylvania.

DAVIS CONTROL — Rankin System, Inc., Portland, Oregon.

BRIEFLY

Marion Aircraft Corporation, Marion, Ohio, will soon place its Marion monoplane in production.

For the convenience of visiting pilots, a Hertz Driv-ur-Self station will be established at the Los Angeles Metropolitan Airport, according to an announcement by Waldo Waterman, field manager.

Aerial Mapping Engineers, Inc., has started mapping 9,000 acres of timber land in the Redwood country near Scotia, Calif. Capt. C. O. Mercer and Lieut. Gordon Mounce are performing the work, using a Travel Air.

Plane manufacturers, flying school operators, finance houses, air mail and transport operators, and others actively engaged in the aircraft industry are now eligible for membership in the 10-year-old Aero Club of Oregon as a result of its recent reorganization.

The work of doubling the size of the Keystone Aircraft Corporation plant at Bristol, Pa., is nearing completion. C. W. Roloson, vice president and works manager of the concern, who has been making a study of European production methods, has just returned to this country, and it is believed will institute some of the foreign methods in the enlarged Keystone factory.

Lee Schoenhair abandoned his attempt to set a new transcontinental non-stop record when he was forced down by adverse weather conditions at Cleveland. He was flying a Lockheed "Vega."

Members of the Aeronautical Chamber of Commerce of America, Inc., have been requested to send in photographs dealing with aviation subjects to the Chamber headquarters at 10 East 40th St., New York, N. Y., so that the Information Section may supply the requests of newspapers, magazines and news syndicates.

A letter of commendation has been sent by the Secretary of the Navy to Aviation Chief Machinist's Mate Clarence H. Walling, U. S. N., for his invention of the gear system now used in handling the sleeve targets and wire tow lines used in anti-aircraft practice.

The Hotel Baltimore, Kansas City, Mo., has agreed to furnish meals for the passengers on the planes of Western Air Express operating from the city. The Fred Harvey System also is reported to be working on a plan to provide dining service on all planes operated by W. A. E.

The Art Goebel School of Flying began operations early this week at the Kansas City, Mo., Municipal Airport soon after the organization moved into its new building on the field.

For the convenience of its flying school students, Curtiss Flying Service is operating a bus service between the city and Fairfax Airport, Kansas City, Mo.

An ordinance, creating an advisory board of seven members to foster aviation locally, has been passed by the City of Lincoln, Neb. Three of the members of the board will serve two years, and the other four will serve four years.

E. A. Watkins, president of Central Air Lines, was the host at a dinner given recently for the representatives of the aircraft manufacturers, the Chamber of Commerce, business and newspapermen to discuss plans for advertising aircraft manufactured in Wichita nationally.

The Edgar L. Bales Investment Corporation, Wichita, Kan., has purchased a three passenger standard Swallow biplane for the use of its officers, and for maintaining contact with the agents of the company in Kansas and Oklahoma.

A Swallow biplane was recently delivered to Rettig Airport, Inc., Wabash, Ind.

A. J. McKenna, who will represent Great Lakes Aircraft Corporation, Cleveland, O., in Wisconsin, Minnesota and Northern Michigan through the Central Air Terminal Company, the sales organization of the aircraft manufacturing concern, will establish an office in the First Wisconsin National Bank Building. Milwaukee, Wis.

Kenosha Airways Corporation, Kenosha, Wis., which will be incorporated for $25,000 and will operate a Ryan brougham and a Consolidated "Husky" training plane at the outset, is said to be in the process of organization.

R. C. Olsen, aircraft designer, is reported to be contemplating the building of an aircraft factory for the purpose of producing a single seater, sport monoplane of his own design. The plane is to have a wing spread of 26 ft. and will be powered with a three cylinder 40 hp. engine.

Twenty tri-engined Ford monoplanes are now being operated by Southwest Air Fast Express on its lines through the West and Southwest.

With the reconditioning of the field at Springfield, Mo., Southwest Air Fast Express has resumed its service to that city.

Braniff Flying Schools, Oklahoma City, Okla., is now conducting night classes.

Tibbs Flying Schools, Oklahoma City, Okla., is reported to have purchased the field owned by Coffman Monoplanes, Inc.

Complete office equipment, including a mahogany desk, dictaphone, filing cabinet and reading lights for night travel, has been installed in the new Ryan brougham purchased by J. H. McDuffee, vice president and general manager for the Prest-o-Lite Storage Battery Company, Indianapolis, Ind.

Aviation Credit Corporation reports net earnings of $90,005 for the first two months of operation ended May 31.

Stout Air Services has started night sight-seeing trips from Pontiac, Mich., airport.

Roy Ahearn, Red Wing Flying Service, Ware, Mass., reports that there is still profit in barnstorming. In the seven weeks from April 28 to June 8, he says that his gross business with one plane was $14,342. He was using a five passenger New Standard sesquiplane and was operating in Connecticut, Rhode Island and Massachusetts.

A flying school is planned by the Pheasant Aircraft Corporation, Fond du Lac, Wis., in addition to its manufacturing activities.

An air passenger express and freight service between Grand Rapids and Milwaukee is planned by John B. Kohler, Chicago, who has ordered two Keystone-Loening amphibions.

Kreider-Reisner Aircraft Company, Inc., expects to manufacture 800 planes this year under the new management.

The Goshen, Ind., radiobeacon has been put in service.

American-made silk cloth has been found suitable for airplane parachute construction, according to the Bureau of Aeronautics, some of the domestic fabrics being found superior to foreign makes.

Plans for the Omaha-Winnipeg air line are progressing, according to Walter F. Hailey, president of the Rapid Air Lines.

Pickwick Airways carried 260 passengers on 26 scheduled flights during the week of June 2 to 8.

Considerable comments have been aroused by the proposal of the Old Westbury Golf Club to erect a high fence between its property and Roosevelt Field, L. I., to discourage low flying.

Fairbanks, Alaska, has been chosen by Doctor Nansen for his northern base.

Roger Q. Williams and Lewis Yancy, pilots of the Green Flash are said to have bought the Bellanca monoplane North Star owned by Mrs. James A. Stillman.

Aviation development of the West will be featured at the 75th Anniversary State Fair and Western States Exposition at Sacramento, Calif., in September.

Eleven business men recently enrolled for complete flying courses with the McMullen Flying School, Tampa, Fla.

The Boston Chamber of Commerce has issued 25,000 copies of a new leaflet containing directions on how to reach all flying fields in and around the city.

Fairchild Aviation Corporation announces it is launching a large concentrated advertising campaign featuring the Fairchild KR product.

Percival H. Spencer, Curtis Flying Service of New England, has been acknowledged by the N.A.A., as holder of the OX-5 altitude record having reached 18,671 ft. June 2 over Boston.

Colonial reports that it operated pessenger service between Boston and New York during the month ended June 20 without a single cancellation and during that time carried 1,271 passengers.

It has been reported from South Bend, Ind., that Bendix Aviation Corporation, may acquire control of the Irving Air-chute Aviation Corporation.

AIRPORTS AND AIRLINES

S. A. T. Announces Air-Rail Line to South

ATLANTA (GA.) — Southern Air Transport has completed test flights and announced tentative schedules for air-rail service from New York to Texas through Atlanta.

Overnight travel between New York and Atlanta, cutting several hours from the fastest schedules, and 24-hr. service from New York to Dallas are contemplated. Passengers leaving New York by train at about 7 p.m. under the new service would detrain at Greensboro or Charlotte, N. C., at about 7 next morning.

Planes will be boarded there and the passengers will arrive in Atlanta about 9 a.m., in ample time for business men to enjoy a full day.

Passengers continuing by plane to New Orleans or to points in Texas would arrive in New Orleans by 3 p.m., making connections with the Southern Air Transport's present line to Fort Worth and Dallas, and putting them in the latter city at 5:30, with a schedule of less than 24 hr. between New York and Dallas.

A similar schedule will be put in force in the opposite direction, passengers leaving early in the morning arriving in Greensboro or Charlotte before dark and proceeding to New York by train.

Six-passenger Fokkers will be used. Operation of the air-rail service is expected to begin in about two weeks, and as soon as additional equipment is secured, it probably will be extended to Los Angeles.

Ask Bids on Northwest Lines

PORTLAND (ORE.)—Bids for establishment of an air mail line from Pasco, Wash., to Spokane; from Pasco to Portland and from Pasco to Seattle will be opened by the postoffice department on August 15, according to press dispatches received here. This will place the three cities in direct air mail connection with the Transcontinental air route at Salt Lake City for the first time. The announcement is in line with the tentative announcement issued some time ago by the department.

Wichita Expects New Mail Line

WICHITA (KAN.)—Robert R. Hasty, local attorney recently in Washington, D. C., has reported to the chamber of commerce here that Wichita probably will get another air mail line within the next 30 days. The route would be from Kansas City to Pueblo, Colo., with stops at Emporia, Wichita, Hutchinson, Dodge City, Garden City and Syracuse in Kansas, and Lamar and La Junta, Colo.

Select Boston Radio Beacon Site

BOSTON (MASS.)—With the official slection of the site for the radio beacon to serve the local airport at East Boston, construction is expected to start at once. The beacon will mark the airway between this city and New York by way of Hartford, Conn. A site is being sought also for a radio communication station here.

P.A.A. Opens Line To Dutch West Indies

MIAMI (FLA.)—Forty-two pounds of mail was aboard the Sikorsky amphibion airplane of Pan American Airways, when it hopped off June 19 for Curacao, Dutch West Indies, inaugurating the extension along the north coast of South America. The mail is consigned to Cristobal, C. Z., points in Colombia, and Curacao.

Three officials of the airways company, J. T. Trippe, president; J. M. Eaton, general traffic manager, and A. A. Priester, chief engineer, were passengers on the plane.

The new air line extension from Cristobal to Curacao will make the line 3,500 mi. long from Miami. From Cristobal the route is along the north coast of South America to Turbo, Cartagena and Baranquilla, Colombia, and thence to Curacao.

Inauguration of the line from the Canal Zone completes regularly scheduled operations by the Pan American Airways of over 5,200 mi. of the "Lindbergh circle" route through the West Indies and Central and South America, and marks the operation of two-thirds of the United States to Buenos Aires line which the company plans to establish soon.

Patrician for Colonial Run

NEW YORK (N. Y.)—The 20-passenger Keystone "Patrician" was scheduled to see its first service on a regularly established airline, Friday, June 28, when it was to make its first flight from New York to Boston under the insignia of Colonial Air Transport. It was announced earlier in the week that the huge plane was to see service on the run through an arrangement made between officials of Colonial company and Keystone Aircraft Corporation.

P.A.A. Gets France Field Hangar

WASHINGTON (D. C.)—The War Department has approved the request of the Pan American Airways to lease a hangar at France Field, C. Z., until January 1, 1930. The lease carries with it permission to use the landing field under such regulations as the commanding officer may prescribe.

Transport Firms Earn $1,204,968

Make Financial Report To Aeronautics Branch

WASHINGTON (D. C.)—Earnings of $1,204,968 were made in the last six months of 1928 by 19 air transport companies in the United States, it is revealed in figures compiled by the Aeronautics Branch, Department of Commerce, on information supplied by the operators.

In this period, the total revenue collected by these companies was $3,858,020, and the expenditures were $2,653,052. An interesting comparison is obtained with the figures submitted by 17 air transport operators for the whole of 1927. In that year, the expenditures of the 17 companies were $2,151,340, while the earnings were $2,201,150.

Of the 19 companies who co-operated with the Department to the extent of furnishing figures on their revenues and expenses, for the last half of 1928, nine had a total income of $3,238,057, and expenses of $1,646,148, showing a surplus of $1,591,909.

Twenty-nine of the 41 companies operating during the last six months of 1928, reported in use and reserve at the end of the year, 268 airplanes valued at $5,226,570, not including those used for miscellaneous operations.

The total personnel employed in the actual handling of aircraft by 28 of these operators in 1928 was 1,036, of which 275 were pilots, 499 mechanics, and 262 others. Pilot's base pay averaged for 25 operators, $194 per mo., with $0.055 a mile for day flying and $0.093 a mile for night flying. The base and mile rate averaged $463.51 a month. Each pilot flew an average of 68 hours a month.

The cost per mile for the 2,372,165 mi. flown by the nine companies previously mentioned, as determined by use of the figure $1,646,148 representing their expenditures during the last half of 1928, was $0.694. The lowest cost of this group was $0.291 a mile while the highest was $2,573. Omitting this one high item, which is twice that of the next highest operator, the average would be $0.659. Where new construction or equipment is charged in one year, obviously the mile-rate must suffer and it can be seen that this high figure is an improper one.

Revenues obtained by air transport companies from the United States during the last half of 1928 for the carriage of mail over the 28 mail routes amounted to $5,103,825.

Report Additional Airport Construction

Development Work Continues in Many Places

About $50,000 more has been provided by the city of Wichita to be used in completing a $150,000 program of improvements at the new Wichita Municipal Airport. This fund will provide for a fence to enclose the field, road improvements, field grading and utility buildings. Projects already started or completed include a large hangar, administration building and lighting system.

Harry F. Knight, of St. Louis, has constructed a landing field for the use of visiting pilots near his ranch at Granby, Colo. South Bend, Ind., is to build a fourth hangar at the municipal airport, this one to cost $10,000. Installation of elaborate lighting equipment is proceeding rapidly at Sky Harbor, one of Chicago's new airports. Pyle-National equipment is being used.

Twenty-two Pyle-National boundary light cones are to be installed at the Ford Airport, Dearborn, Mich., and twenty of the same cones are being installed at the Pal-Waukee Airport northwest of Chicago.

New Dycer Hangar

The Braden Steel Corporation is to build a 100x83 ft. hangar, all steel, costing about $20,000 for the Garland Aircraft Corporation at the Garland Airport, Tulsa, Okla. Construction of an additional three-plane hangar has been completed by the Dycer Airport.

About $200,000 was included in the Little Rock, Ark., bond issue for the purchase of equipment and a suitable municipal airport. No announcement has been made about the site as yet. Charles W. Grimes, independent oil operator of Tulsa, Okla., has been in Arkansas for some time seeking a site for an airplane landing field.

It is reported the Aviation Corporation of America has closed negotiations for the new Chicago airport to be located southwest of Harvey, Ill. The approximate cost of the project is about $2,000,000, according to reports.

Moline, Ill., will vote July 2 on the proposal to increase the general tax levy two mills a year for the next five years to provide a fund for the establishment and lease or purchase of a site for a municipal airport.

The new Montgomery, Ala., Airport is in commission and the Montgomery School of Aeronautics has moved all its equipment to the new quarters. Work has started on the $150,000 improvements at the Mercer Airport, Trenton, N. J.

St. Louis is seeking a government weather station at the Lambert-St. Louis Field and has voted to lease 13 additional acres of land at the northeast corner of the field to the Curtiss-Robertson Airplane Manufacturing Company. This concern is starting a $300,000 addition to the present plant for the production of the "Thrush," a recently developed six-place cabin plane.

The resident flying school of Skyways, Inc., of Boston on the 160-acre farm on Cape Cod near West Barnstable has been completed. The first regular seaplane terminal in New York was dedicated June 15 at North Beach, Queens. This project has been developed by New York Air Terminals, Inc., and is being used by Coastal Airways and Curtiss Flying Service.

The Memphis, Tenn., Municipal Airport was dedicated with an elaborate program June 14-15 under the auspices of the Memphis Chamber of Commerce and the Memphis Airport Commission. It is a 202-acre tract and the total investment is close to $250,000.

Sky View Lines, Inc., dedicated its new Buffalo airport and terminal building also on June 1 with an aerial program of races and stunts. Other airports recently dedicated include that at Rice Lake, Wis.; Cedar City, Utah, and Kerrville, Tex.

Continental Starts Service

LOS ANGELES (CALIF.)—Continental Air Express opened a new service between this city and San Francisco on June 15. Tri-engined Fokker and Lockheed planes are flown on this route leaving Alameda Airport, the northern terminal, daily at 8:30 a.m., arriving here at 12:00 noon. The return plane leaves this city daily at 3:30 p.m. and arrives at the Alameda Airport at 7:00 p.m. Stops are made at Coalinga, Taft, Bakersfield and Fresno. Connections with San Francisco across the bay are made by means of speed boats.

Colonial Launches Toronto-Buffalo Line

BUFFALO (N. Y.)—Inauguration of a twice daily passenger service from Buffalo to Toronto was scheduled by Colonial Western Airways, Saturday, June 29. The flight time between the two cities is 45 min. with the Sikorsky amphibions, which the airways officials expected to place in service on the line.

The landing at Buffalo is at the foot of Georgia Street and at the foot of Scott Street in Toronto. Ramps and flats for the planes have been completed, and the passenger stations where customs and immigration inspections will be held are now in the course of construction.

According to the schedule, the morning planes leave Buffalo at 9:50 A.M., daylight saving time, and arrive in Toronto at 10:35 A.M. They return at 11:15 A.M. and arrive in Buffalo at noon. Afternoon planes leave Buffalo at 5 P.M., reach Toronto at 5:45 P.M., leave there at 6:30 P.M. and arrive at Buffalo at 7:15 P.M. The fare one way is $17.50. Round trip tickets are $30, with allowance for a 30-day stop-over. Ten-trip commutation tickets, good for one year, are to be offered at $14 per trip.

Plan Dedications For Many Airports

Many airports are being dedicated or are being completed for early dedication, according to the despatches which reach the office of AVIATION.

Among those recently formally opened is the Pontiac, Mich., Airport which expects, by the way, to be the first to receive the new Aeronautics Branch airport recognition. A two-day air meet following Michigan's first state air tour comprised the dedication ceremonies. An elaborate program of races and stunting marked the opening of Welch Field, Anderson, Ind., recently. A similar program was arranged for opening of the Elkhart, Ind., Municipal Airport.

Red Bank, N. J., Airport backers are planning a four-day air meet with $6,000 in prizes on July 3, 4, 5 and 6. A grandstand for 4,000 spectators has been erected. The T.A.T. airport at Clovis, N. M., known as "Portair," will be dedicated on July 4. This is an air-mail transfer point for the transcontinental service. Equipment includes a passenger station by the railroad tracks, a large hangar, radio station and lighting.

The Coleraine, Minn., Airport will be dedicated July 4, also. The official opening of the Bridgeport, Conn., Airport is to be held July 5 and 6. It has been operated since October under the management of the Curtiss Flying Service.

Another air-rail junction point, the new Columbus, Ohio, Municipal Airport, will be dedicated July 6, 7 and 8. Considerable construction is still going on there in an effort to make Port Columbus one of the finest air harbors in the country.

The rebuilt Pueblo, Colo., Municipal Airport will be opened on July 10. Grand Island, Neb., will open its port July 13 and 14. Dedication of Hensley Field, the new Army Field at Dallas Tex., will be held July 20 and 23. A building program is being pushed at Big Spring. Tex., in order that the airport there may be dedicated August 23 and 24.

Maddux May Open Service to Seattle

PORTLAND (ORE.)—Establishment of a new passenger service between Seattle and Oakland, Cal., is contemplated by the Maddux Air Lines of Los Angeles, it became known here recently.

The proposed route would lie east of the Cascades in Oregon and the midway stop would be at Klamath Falls, Ore., instead of Medford, Ore., of Montague, the present stopping places of P.A.T. and West Coast Air Transport.

Vancouver Firm Links Resorts

VANCOUVER (WASH.)—A weekly airplane passenger service between Vancouver and the beach resorts of Long Beach, Wash., and Seaside, Ore., has been started by the Columbia Empire Flying Service with the Vancouver Airport as headquarters.

Announce Papers For Western Meeting

BOISE (IDA.)—Presentation of papers on aviation subjects by a number of well-known persons will feature the first Aeronautic Conference of the Western States to be held here July 8. These papers will include one telling of the aviation situation as it exists today with special reference to federal aid in air navigation. This is to be presented by a representatve of the Aeronautics Branch, Department of Commerce, probably Maj. Clarence M. Young, director of aeronautics.

Among the other papers that will be presented is one citing the work that the Western states are doing to supplement that of the government in promoting aeronautics. This paper is to be read by the governor of one of the states represented at the conference. Other papers will include one by a representative of the Aeronautical Chamber of Commerce of America, Inc., which will tell what the aircraft manufacturers and operators need in the way of public cooperation. A representative of the Inter-Departmental Committee on Airways, Assistant Postmaster General Glover, it is believed, will tell those in attendance what the various states may do to aid the federal government in the program for the establishment of airways. Col. H. H. Blee or Capt. F. C. Hingsburg of the Department of Commerce may also present a paper on the technical development of airports.

Start Akron-Detroit Service

AKRON (OHIO)—Regular air trips between here and Detroit were started June 24, by the Middle States Air Lines, Inc. The line is known as the Rubber City Air Express. Lockheed four-passenger planes are being used in the service and trips are made on Mondays, Wednesdays and Fridays, with a flying time of one hour and 20 minutes including a five-minute stop in Toledo. The company formerly was known as the Ohio Lockheed Sales Corporation. Planes leave Akron Municipal airport at 8:30 a.m., arrive at Toledo at 9:20; leave Toledo at 9:25, and reach the Detroit Municipal airport at 9:50 a.m. Return trips to Akron start at 5:30 p.m., and end at 6:50 p.m.

Start Boston-Nantucket Line

BOSTON (MASS.)—Daily flying service from the East Boston Airport to Nantucket Island was started June 17 by the Curtis Flying Service. The schedule calls for a daily service excepting Sundays, by way of Hyannis and Martha's Vineyard. Planes leave Boston at 4:40 p.m., stopping at Hyannis at 5:10, Martha's Vineyard at 5:40 and reaching Nantucket at 6. The planes make the return trip in the morning. Later a week-end service to Portland, Rockland and Bar Harbor will be started.

Thompson Gets Insurance

CLEVELAND (OHIO)—W. E. Close, treasurer of Thompson Aeronautical Corporation, has announced that his company has been issued insurance policies covering a potential total liability of $4,000,000. Nearly every form of insurance is carried, including fire, tornado, theft, public, passenger liability and property damage.

Delta Air Service Starts Passenger Line

SHREVEPORT (LA.)—Delta Air Service, Inc., of Monroe, La., has established a regular tri-weekly passenger service between Jackson, Miss., and Dallas, Tex., with stops at intermediate points. The service was launched June 17 and plans are being made to extend it to Birmingham or Atlanta, Ga., according to officials.

The trip requires 5 hr. 40 min., with stops at Shreveport and Monroe, La. Planes leave Dallas at 8 a.m. and arrive at Jackson at 1:40 p.m. and leave Jackson at 10:20 a.m. and arrive at Dallas at 4 p.m. The service will be extended to Birmingham or Atlanta, contingent on which route the government selects for the New York-to-Dallas air mail. Six-place Travel Air cabin monoplanes are used.

Start Tri-Weekly Service in the South

COLUMBUS (GA.)—Tri-weekly air passenger and express service from Columbus to Atlanta and Montgomery began Monday morning, June 24.

The plane leaves Montgomery at 8 a.m., arriving at the Columbus airport at 9. After a 15-min. stop-over, it proceeds to Atlanta, reaching Candler Field at 10.30.

On the return trip, the plane will leave Atlanta at 4 o'clock in the afternoon, arriving in Columbus at 5:15. It will leave the Columbus airport at 5:30, arriving at Montgomery at 6:30.

The Montgomery School of Aeronautics, a subsidiary of the Southern Air Express company, will operate the line on Monday, Wednesday and Friday each week.

Radio Demonstrated in Fog

HADLEY FIELD (N. J.)—Fog-conquering possibilities of the radio beacon and radio voice facilities on mail planes were demonstrated again recently by Pilot Jack Webster of N.A.T. when he landed safely here through a heavy fog bank with only a 350 ft. ceiling. Fifteen-minute broadcasts from the airport kept him informed about the weather conditions as he approached the field and then sustained conversation between the ground and the plane was maintained as the machine was flown back and forth across the airport to enable Webster to determine his location. He was able to break through the ceiling near the east boundary of the airport as he glided in to land.

Lindbergh Reports On T. A. T. Progress

ST. LOUIS (MO.)—A report of Col. Charles A. Lindbergh, chairman of the technical committee of Transcontinental Air Transport, Inc., advises that a fleet of ten Ford planes powered with 400 hp. Wasps will be used to inaugurate the cross-country air-rail service July 8. Five planes will be allowed to the eastern and five to the western division. Two will be placed at each end of the divisions with one in reserve at central points, St. Louis, and Winslow, Ariz. The reserve machine will be put into service once a week so that no plane will be out of service longer than a week.

"The motor overhaul work will be taken care of at Columbus and Los Angeles, where sufficient machinery and mechanical forces will be maintained to overhaul four Wasp engines each week, two at each terminal," the report states. The manner in which planes will be serviced and fueled at each field, allotting specific duties to each member of the field crew, then is discussed. Planes should be gassed and the oil supply replenished within three minutes, according to the report.

Colonel Lindbergh reports that the selection of pilot personnel, as announced in the June 15 issue of AVIATION, occupied a period of several months and covered the entire country. As a result, the average flying time of the "first" pilots is about 3,000 hr., including an average of 500 hr. on tri-engined planes alone.

Practical flying over the line was to start June 24, following "refresher" drills in radio operation and instrument flying.

Device Indicates Radio Shift

WASHINGTON (D. C.)—A new instrument, known as a "course shift indicator," has been developed by the Bureau of Standards for the purpose of indicating whether or not a radio beacon course is remaining in its proper position. If trouble should develop in the apparatus of a radio beacon, the course might shift without the knowledge of the attendant. The new instrument, which is in reality an accessory to the radio beacon and will be installed on the switchboards of radio beacon stations, is designed to prevent this occurrence. By watching the indicator, a shift in the course can immediately be detected, and corrected.

New Radio Units About Ready

WASHINGTON (D. C.)—The Aeronautics Branch has announced that four new airways communication stations will be placed in operation early in July and that four more probably will be completed before August 1. The first four will be located at St. Louis, Mo.; Kansas City, Kan.; Wichita, Kan., and Glendale, Calif. The others are to be situated at Fresno, Calif.; Medford, Ore.; Portland, Ore., and Seattle, Wash.

FOREIGN ACTIVITIES

"Townend Ring" Installed on Argosies

LONDON (ENGLAND) — The "Townend Ring," named for its inventor, is one of the new features embodied in the latest type Armstrong Whitworth Argosy being installed on the London-Paris Silver Wings service.

Except for refinements which they embody, the planes are practically the same as the original machines of this type which first were put in service several years ago. They are powered with the Armstrong Siddeley Jaguar 380 hp. engines.

The Townend Ring is an air resistance reducing device somewhat similar to the N.A.C.A. cowling in the United States. It encircles the tops of the cylinder heads, but does not project back to the rear of the cylinders. It is of a section approaching that of an airfoil. It does not cover as much of the front of the cylinders as does the N.A.C.A. type.

The planes are fitted also with Handley-Page automatic slots and have the Servo-control device attached to the ailerons, a distinctly new feature. The purpose of the Servo-control is to assist the pilot in moving the ailerons which are liable to require considerable force in a machine of this size.

The controls are coupled to the ailerons in such a way that when the pilot moves the lateral control these rudders are set over and are thereby subject to a sideways air force. This force is such that it tends to force the ailerons in the desired direction and thus relieves the pilot of much of the work of moving them by his own exertions.

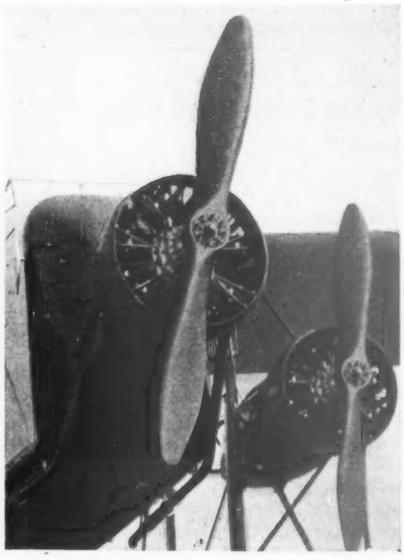
The Argosy accommodates 20 passengers, two pilots and a steward, and carries fuel for 3½ hr. at 95 m.p.h. cruising speed with a total useful load capacity of 5,000 lbs.

Open New London Airport

LONDON (ENGLAND)—Airwork, Ltd., a recently formed company which plans to build an airport chain in Great Britain, has opened a new airport near here. A flying school has been opened and the field is said to offer excellent possibilities for aircraft sales display purposes.

Chile Buys Fairchilds

SANTIAGO (CHILE) — The government has purchased six Fairchild FC-2 cabin folding wing planes for use in air mail service between this city and Antafagasta, 1,500 mi. to the north. Delivery of the planes is to be made within about two months.



Showing the "Townend Ring" in position on Jaguar engines of the new Argosy transport

Completing French Racers

PARIS (FRANCE) — French entries in the forthcoming Schnieder Trophy Contest will include Nieuport-Delage and Bernard monoplanes. The former is to be fitted with a new Hispano Suiza engine of about 1,200 hp. and it is hoped that 1,500 hp. will be realized. The Bernard will be fitted with a Gnome-Rhone 1,000 hp. aircooled radial.

Foreign News Briefs

A new concern has been formed at Saint John, N. B., to be known as Atlantic Airways. It will be Maritime distributor for the Reid Rambler. W. W. Rogers of Saint John, will be manager.

The E. T. A. Company has inaugurated daily air mail service between Rio de Janeiro and the City of Campos in Rio de Janeiro State, South America.

The squadron of Italian seaplane bombers of the Savoia-Marchetti type have returned to Taranto, Italy.

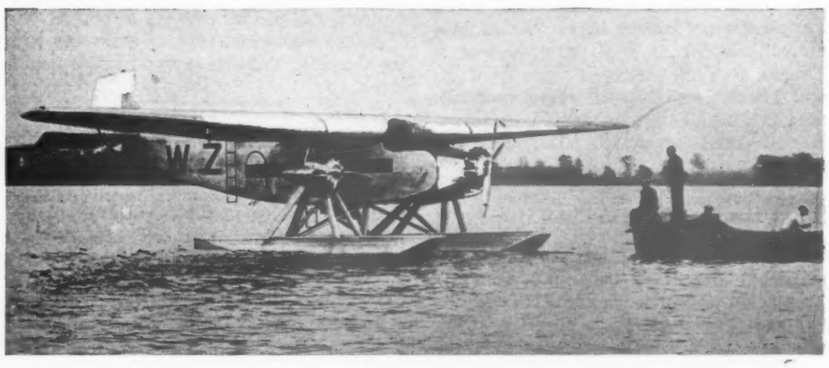
Bert Hinkler has received the F.A.I. gold medal for his fifteen-and-a-half-day flight from England to Australia last year.

One of the nearest ports for thirteen steamship lines has an excellent natural harbor and has been chosen by the Spanish Government as the national airport. It is intimated that it may become a base for trans-Atlantic seaplane service by way of the Azores.

Test Four-Engined Caproni

ROME (ITALY)—The Caproni CA 79 recently passed unofficial flight tests. It is adapted for both military and commercial purposes and is powered by four Asso 500 hp. engines, installed in tandem in pairs between the wings. The upper wing has a span of 78 ft. and the lower wing a span of 108 ft. The length is 53 ft. The construction is all metal with fabric covering.

Canada Gets Pontoon-Equipped Ford



OTTAWA (QUE.)—The first tri-engine Ford transport equipped with pontoons has been delivered to the Canadian Government for use in dusting spruce forests of central western Canada in the fight against the spruce worm. Use of floats was made advisable by the vast number of lakes and rivers.

About 1,600 lb. of powder can be carried in the cabin of the machine. The engines are J-6 Wrights giving the machine a high speed of 127 m.p.h. This type of plane was selected because of the necessity of flying close to the treetops involving some hazards for a single engine machine.

THE BUYER'S LOG BOOK

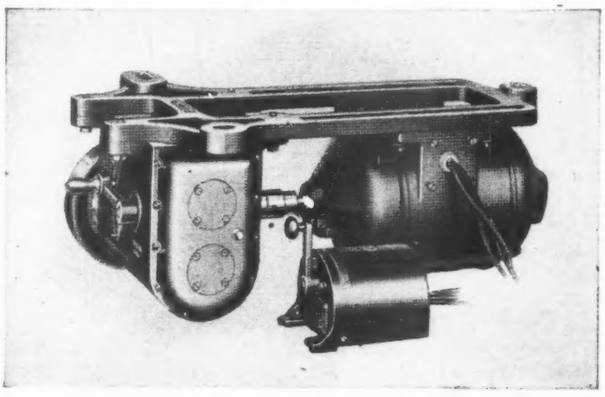
Stark Motor Drive Unit

A NUMBER of aircraft manufacturing plants are making use of the motor drive unit developed by the Stark Tool Company, Waltham, Mass. This unit is designed to meet the demand for a compact and efficient individual motor drive which can be adapted to bench lathes, and bench milling machines.

It is intended to be mounted under the bench on which the lathe or miller is located and drive through a single belt elimniating all overhead shafting and belting and leaving bench space entirely clear.

Three speed changes may be obtained by shifting a single lever while the machine is running and three more by shifting the belt to another step of the cone driving pulley. When a reversing motor can be used these same ranges of speed may be obtained in reverse.

The Stark motor drive unit is designed on the sliding key principle with built-in speed reduction. The driving gears are non-metallic and mesh with hardened steel gears running on a hardened and ground shaft. The three shafts are mounted in Timken roller bearings which



A photograph showing the motor drive unit developed by the Stark Tool Company

are easily adjustable for wear. Lubrication is obtained by a bath of medium grade engine oil.

The clutch is of the simple expanding type having only four moving parts and is smooth and powerful in operation. It is easily accessible for adjustment and is controlled by means of the conventional foot treadle which leaves both hands of the operator free.

Regular equipment includes base plate, motor drive unit and flexible coupling. The motor and control are not included. Use of a one-half horsepower 1,725 r.p.m. motor with reversing switch when the current will permit it is recommended by the company. The motor should be of the smallest model obtainable to make a compact installation. The company is prepared to furnish any make of motor if desired. The net weight of the motor drive unit with regular equipment is 75 lb. and the gross weight is 120 lb.

The company also manufactures a number of other machines and tools useful in the aeronautic industry.

G. E. Magneto Compass

ANNOUNCEMENT has been made by the General Electric Company, Schenectady, N. Y., that the Magneto Compass recently developed by its research laboratory is now on the market. This compass is simple in construction, accurate in readings, and the complete unit has a weight of approximately eight lb. net.

Magneto compass with cover removed

The new compass is a remote indicating device operated on the principle of the earth inductor compass, and having pole pieces which give the directional effect and at the same time concentrate the lines of force of the earth's magnetic field, thereby producing a dense field in which to operate. The rotating armature in the magneto compass is small, has but a few turns of wire, and operates at a relatively low speed.

Improved Bowser Fuel Pit

A NUMBER of improvements have been made in the fueling pit for airports manufactured by S. F. Bowser & Company, Inc., Fort Wayne, Indiana. This equipment is in use at many large airports throughout the country.

The first improvement is an electric weatherproof socket and lamp shade which illuminates the figures on the meter counter. This feature makes the gallonage figures easily read when night fueling is necessary and eliminates the inconvenience of having to use a flashlight or some other means of getting the regular number of gallons dispensed. The second change is an improvement in the hose rewinding apparatus. This is a ratchet arrangement with a removable handle. When the fueling operation is completed and the hose is to be returned to the reel, the operator merely works the rewinding apparatus and the hose is evenly and quickly wound in the reel.

The electric lamp previously mentioned is controlled by the same switch that controls the pumping unit in such a manner that it is impossible to operate either separately.

Piston Pin Catalog Sheet

THE first aeronautical piston pin catalog sheet to be issued by the Burgess-Norton Manufacturing Company, Geneva, Ill., has just recently come off the press. This sheet is exceptionally complete for leading popular types of aero engines. The listing shows the name and year of the engine, the diameter of piston and stroke as well as the number of cylinders. Burgess-Norton piston pins are known as "Perfectlap" Pins, this name being descriptive of the high finish given the pin.

Van Dorn Electric Drill

ANNOUNCEMENT has been made by the Van Dorn Electric Tool Company, Cleveland, O., of a new ¾ in. electric drill equipped with a chuck for straight shank bits and having a drilling capacity of ¾ in. in steel. This drill is intended for heavy work required in maintenance and because of its rugged construction, high

The Van Dorn ¾ in. Electric Drill

power and low speed, is particularly suited for driving rigid set cylinder grinders and hones.

The motor is a Van Dorn built unit equipped with ball bearing armature and automatic safety switch. This motor is suitable for operation on alternating or direct current and is furnished for service on 32, 110, 220 or 250 volts.

"Fire Gun" Extinguishers

THREE fire extinguishers operating on the same principle but having different capacities and adaptable to airplane use are offered by the American La France & Foamite Corporation, Utica, N. Y. The model No. 0 is the one quart size, the model No. 1 the 1¼ quart size and the model No. 2 the 1½ quart size.

The "Fire Gun" carbon tetrachloride extinguisher consists of a double acting pump operated by hand and enclosed in a brass shell. The double action feature provides the advantage of supplying a steady stream of liquid instead of an intermittent stream. The Fire Gun extinguisher is finished in solid brass and is packed complete with a bracket for mounting. The fluid employed will not freeze at a temperature of 50 deg. below zero F., will not damage any part of the airplane and is a non-conductor of electricity.

Red or red with nickel finishes can be provided as well as polished brass. It is unneccessary to recharge these units annually but it is recommended by the company that periodic inspections be made to assure that they are always fully charged and in operative condition.

The piston and piston rod fit into the pump cylinder which is connected at each end through castings with brass tubes leading to a central valve casting. Upon operation of the pump the fluid is drawn up by the vacuum created behind the piston through either or both of the intake tubes through castings and then through one tube on the pull stroke or the other on the push, filling the pump cylinder behind the piston. The fluid is thus drawn into the piston tubes and is expelled by the force of the piston alternately through the tube to the castings.

SIDE SLIPS

By Robert R. Osborn

Probably this suggestion will be too late to help New York in its problem as to the proper way to receive the "Yellow Bird" stowaway, but our idea of an appropriate ceremony would be something along this line. Have the welcoming parade follow the same route as was taken by the Lindbergh parade, with Grover Whalen in the first car enthusiastically spanking the stowaway throughout the entire trip, with Mayor Walker putting the finishing touches to the spanking on the steps of City Hall.

* * *

Some of the astounding new features incorporated in large passenger airplanes are discussed in an article in a recent issue of the *New Yorker,* called to our attention by F.G. of Mitchel Field, New York. "For a minute we stood behind the glass door of the cockpit and watched the pilots run the plane. Each had his hands on a small steering wheel which controls the rudder. One pilot at a time of course, actually steers, but in practice the reserve pilot also keeps contact with the rudder. The plane can be managed from either control. On a dashboard between the pilots were the three throttles—short levers —one for each motor; a longer lever in the floor controls elevation—the brakes of the landing wheels are worked from pedals. Without brakes the pilot would not be able to steer when on the ground; it is from them that comes the dismal, moaning noise you hear as you are getting ready to take off."

And, we might add, as more information for the readers of the *New Yorker,* that dismal moaning noise you hear as you are about to land after a long trip on a rough day is from the air-sick passengers.

* * *

As another record for the book, Messrs. Conerton and Lawless, of the Curtiss Flying Service, report that during the air races which were part of the celebration of opening New York's seaplane base, they won the first race in history in which Japanese stewards were carried on all planes.

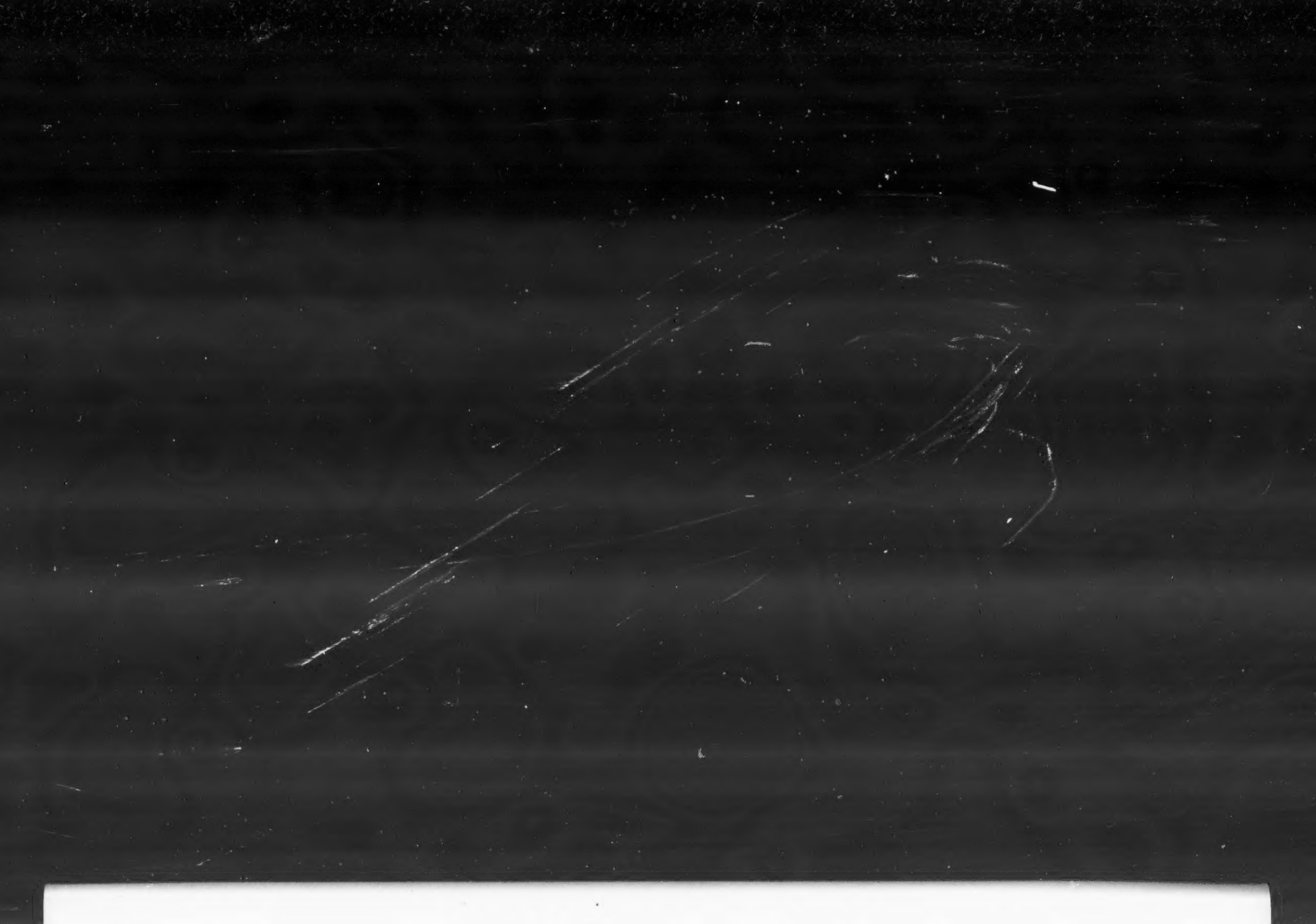
As we rush to press we have not been able to determine if the record is official or not, as there is no information given as to whether the Japanese stewards were officially sealed by the N.A.A. before the flight was made.

* * *

R.W., who has been doing some testing on a new seaplane dropped in to inquire what clearance was required by the Department of Commerce between the tips of propeller blades and the side of a plane. We looked it up and told him one inch was required. "We're all right then," he said, "we have three blades and a third of an inch clearance on each."

* * *

An item in the papers states that the "deadly" flat spin can now be controlled. If this is true we suggest that the method of controlling the flat spin be put to immediate use. The other evening we attended another banquet at which two speakers got into the deadly flat spin and stayed there for an hour each.



What

does the name FAIRCHILD *mean to you?*

¶ If you are a pilot, *Fairchild* suggests at once dependable airplanes, reliably engineered and built, filling your needs of stamina, controllability and high performance.

¶ If you are an operator, *Fairchild* spells economical transportation, low-cost maintenance, proven dependability, highest standards of service and airplanes for every requirement.

¶ If you are a dealer, *Fairchild* offers a full line of biplanes and monoplanes, rightly priced, backed by fair and equitable sales and service policies, preeminent in design, luxury and beauty.

¶ No matter what your part in aviation, *Fairchild,* through financial strength, research facilities, modern plants, methods and machinery, means quality and value and profit opportunity elsewhere unequalled.

¶ That is the true significance of the name of *Fairchild.*

THE FULL LINE

For all-purpose work consider carefully these two models

FOR flight performance, for smoothness and ease of operation, for fineness of detail and finish, for completeness of equipment, compare Fairchild KR 34 with any other three-place plane selling for even $1500 more.

Fly the Fairchild KR 34 and we are sure you will agree that it outperforms, outlooks and will outlast any of them because Fairchild KR 34 is the result of Fairchild quality brought to biplane development.

In actual flight tests made under full load, Fairchild KR 34 gets off the ground quicker, climbs faster and shows more speed in the air than any other airplane using the same power plant and carrying an equal load. Any Fairchild KR dealer welcomes an opportunity of proving these statements.

The sportsman who wants extra power and a little more room than the Fairchild KR 21 gives him also will find Fairchild KR 34 attractive. He can use it to carry extra passengers. An ample baggage compartment is provided for luggage or duffel for sporting trips.

For the operator in smaller communities who can use to advantage one, two, or perhaps more, open cockpit biplanes, Fairchild has a particularly available airplane in the lower-cost three-place Fairchild KR 31.

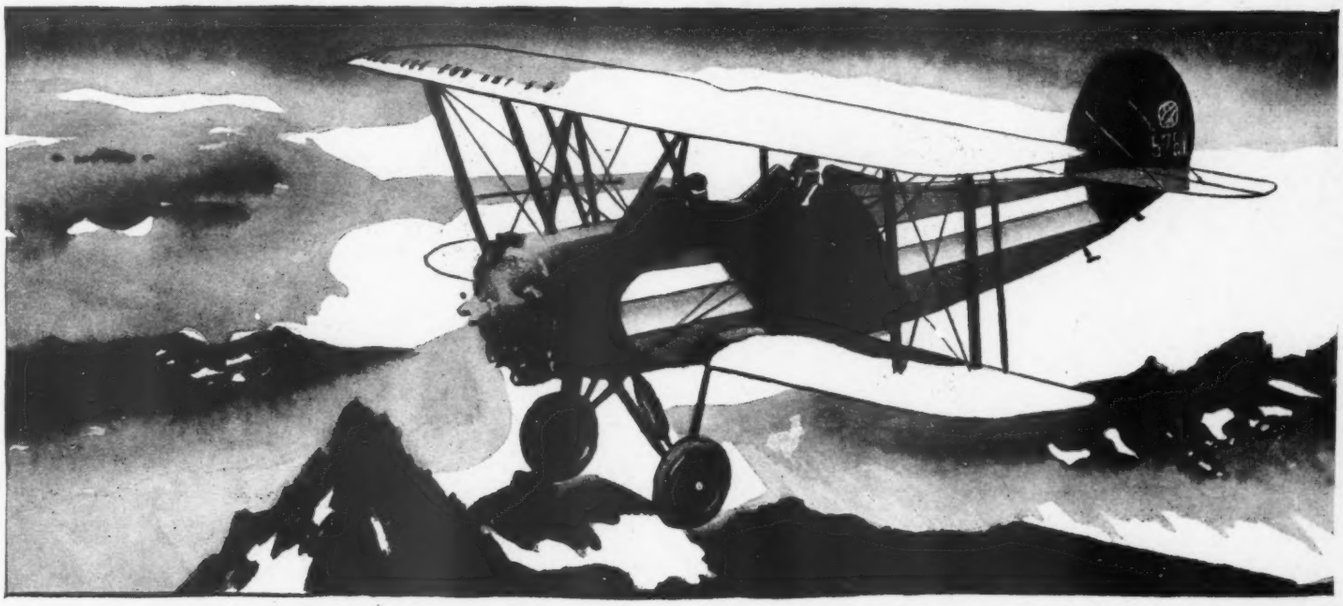
FAIRCHILD KR 34, *three place. Wright 165 h.p. engine. We challenge comparison with any other airplane priced at even $1,500 more.*

FAIRCHILD KR 31, *three place. OX5 engine. Will outperform any other airplane with same engine and payload capacity.*

FAIR

For Flight Instruction

and for sport THE FAIRCHILD KR 21



The KR 21 *is Fairchild's answer to a nation-wide demand for a fine training plane. Two place. Kinner engine.*

THE new Fairchild KR 21 is Fairchild's answer to the demand for a plane designed specifically for training, whether primary or advanced.

Fairchild KR 21 has precisely the right response to controls—not too sensitive, but not sluggish. The student will not find it tricky to fly—the more advanced pilot will delight in the high performance that results from clean design, light weight and plenty of power.

Fairchild KR 21 is doubly braced and stressed to meet everyday rough usage by students or the severer strains of the aerobatics of more advanced flight training.

Tapered wing construction gives Fairchild KR 21 maneuverability unusual in a training plane. Wide landing gear and correct design make it possible to land and to handle Fairchild KR 21 on the ground in any weather.

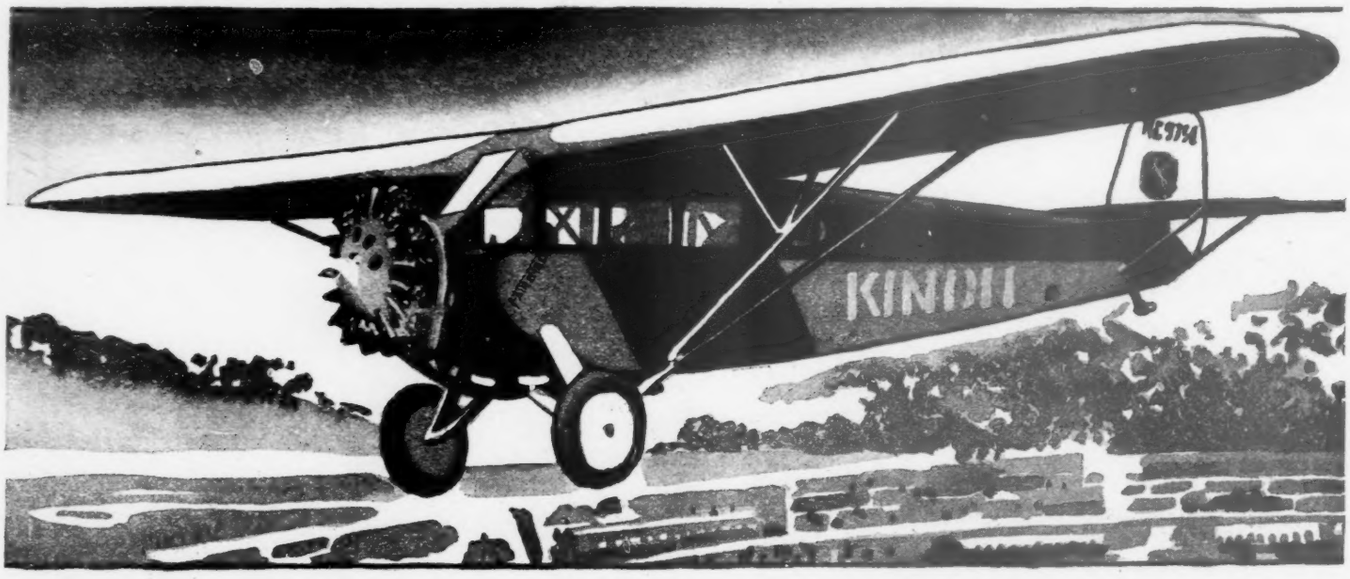
Economical, too. Low first cost. Sturdiness of construction and interchangeable parts mean low maintenance cost.

Then, too, the man or woman who buys a Fairchild KR 21 for sport use will find it ideal. Speed, power, ease of handling, high performance, are the very features the sport flier seeks. These desirable qualities are found in highest measure in Fairchild KR 21.

CHILD

THE FULL LINE

To complete your operating equipment the FAIRCHILD "71"



Flying daily all over the United States and Canada in profitable service for air line and fixed base operators. 425 h.p. Wasp engine.

Profitable to operate and to sell

FLYING field operators are finding the seven-place Fairchild "71" a double source of profit. Its greater payload than any cabin plane of equal horsepower, its lower cost of operation, its fine performance and luxurious comfort, are helping in the development of the increasing business of charter or taxi service.

As a de luxe attraction for sightseeing trips, Fairchild "71" is a paying adjunct to the equipment of any flying field. Colonial Flying Service, famous Roosevelt Field, Akron Air Services, Pittsburgh Aircraft Agency, Embry-Riddle at Cincinnati, Yellow Cab Airways at Des Moines—to name only a few—are making money regularly with their Wasp-powered Fairchild "71s."

Fairchild "71" presents an opportunity for enterprising dealers who can develop sales for airplanes of this type. There is a growing market among operators, commercial houses and wealthy individuals for a cabin monoplane performance at a cost consistent with reasonable and practical investment and maintenance.

Fairchild "71" fills an important place in the Fairchild full line—profitable to operate and profitable to sell.

For information about any Fairchild products, write

FAIRCHILD AIRPLANE MANUFACTURING CORPORATION · FARMINGDALE, LONG ISLAND, NEW YORK

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In Canada: Fairchild Aircraft Ltd., 505 Confederation Bldg., Montreal, P. Q.

FAIRCHILD

THE FULL LINE

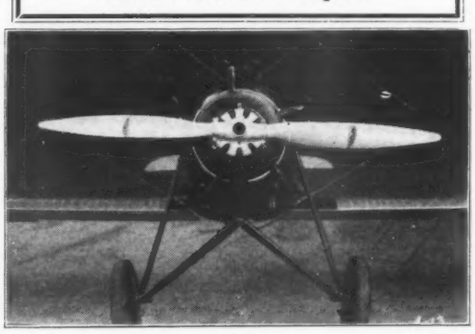
Including monoplanes, biplanes, aerial cameras, pontoons, skis, landing lights and boats. Fairchild is the pioneer in aerial surveys.

A short run
. . . *in and out*

THE WACO "165" STRAIGHT-WING lands as slowly as the famous "OX5" WACO . . . and it has the *added* advantage of bigger wheels with Bendix brakes and large braking surfaces. It lands in the smallest fields, with a short run. And it gets *out* again with a short run . . . climbs quickly . . . handles easily . . . and has a top speed of 125 and better.

Fly the "165" Straight-Wing. You'll wonder that such a remarkable plane can sell for such a moderate price. It couldn't . . . except for WACO'S overwhelming popularity.

SPECIFICATIONS
WACO "165" STRAIGHT-WING
J-6 Wright "Whirlwind" Motor
(165 H.P.—5-cylinder)
Wood propeller
Bendix brakes
Navigating equipment
65-gallon gas tank
3-place. . . Dual controls
Customer's choice of colors
$6370
(Add $275 for metal propeller)
Further details on request



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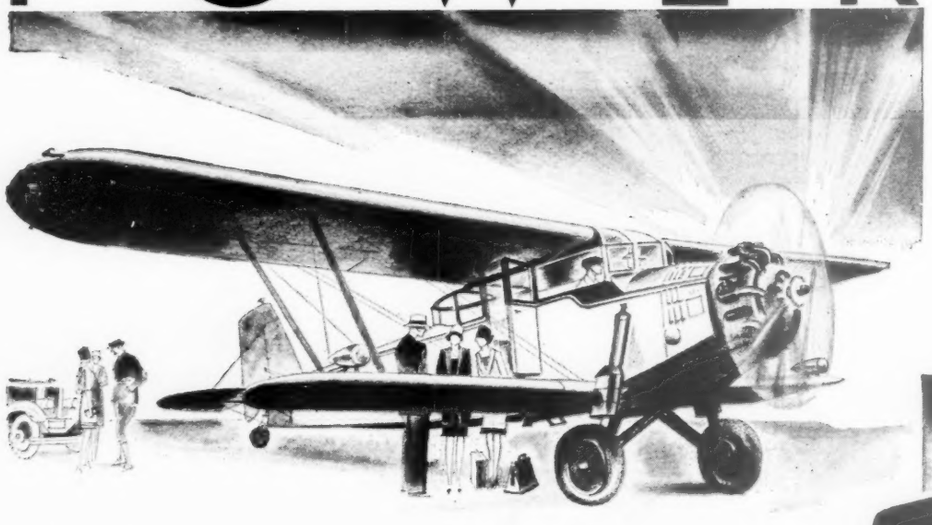
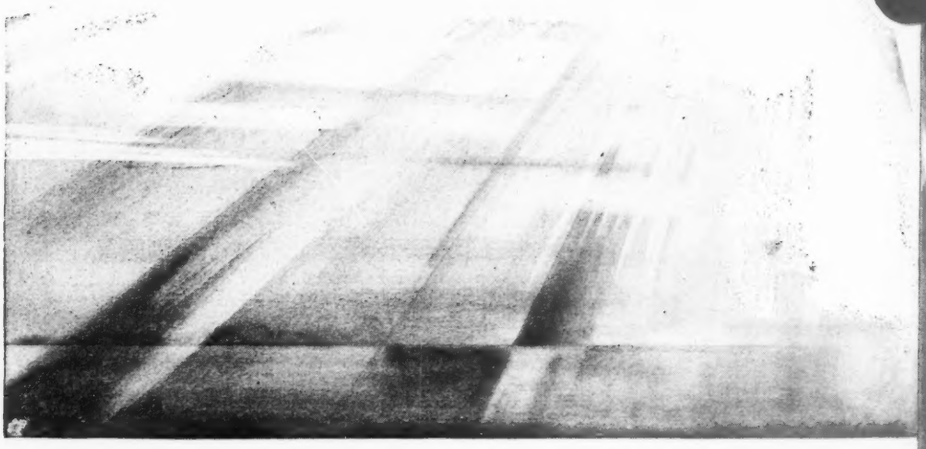
POWER





"... like a skyrocket"

CONTACT! The new Stearman Royal Coach hops off!...it's beautiful, graceful, luxurious and complete...Power aplenty, like all Stearmans. Power that gives these ships that easy nonchalance in take off, that lack of strain in altitude or storm, and longer runs between overhauls. For you can throttle down, use only a part of the available power, and still be going somewhere...These things are Stearman, the favorite name among pilots.

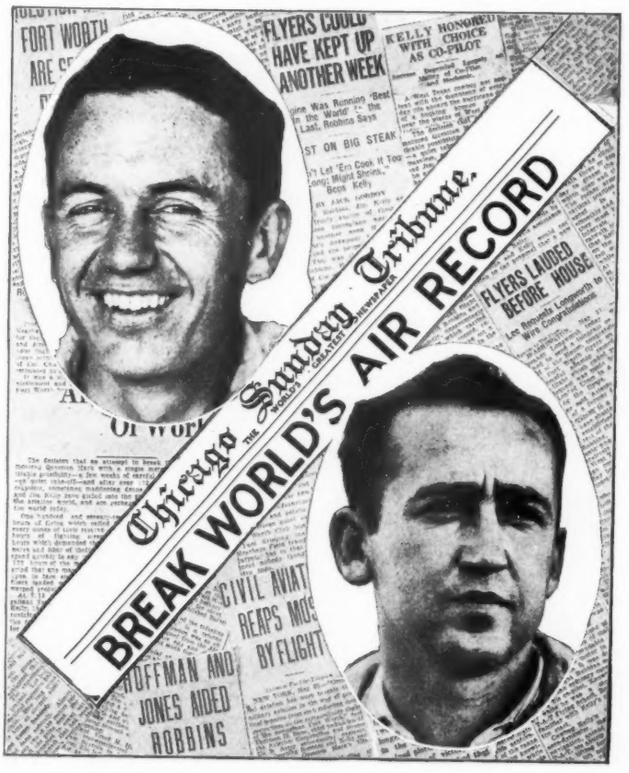
WEIGHT DATA		PERFORMANCE DATA	
Weight, light	2565 lbs.	Maximum speed	135 miles per hour
Pay Load (with 100 lbs. baggage)	780 lbs.	Cruising speed	115 miles per hour
Fuel (110 gallons)	660 lbs.	Landing speed	47 miles per hour
Oil (10 gallons)	95 lbs.	Service ceiling	16,000 feet
Gross weight	4270 lbs.	Rate of climb (sea level)	900 feet per minute

THE STEARMAN AIRCRAFT COMPANY, WICHITA, KANSAS

STEARMAN

"Cowboy" Jim Kelly is T-A-T *Graduate*

Joint-Holder of World's Endurance Flight Record Enrolled at T-A-T Private Flying School a Year Ago


FLYERS COULD HAVE KEPT UP ANOTHER WEEK
KELLY HONORED WITH CHOICE AS CO-PILOT
Chicago Sunday Tribune
THE WORLD'S GREATEST NEWSPAPER
BREAK WORLD'S AIR RECORD
FLYERS LAUDED BEFORE HOUSE
HOFFMAN AND JONES AIDED ROBBINS

"COWBOY" KELLY, a year ago a green rookie fresh from the ranch, is today with Reg Robbins among the world's greatest fliers!

That Reg Robbins chose Kelly as his co-pilot on the world's greatest endurance flight—and Kelly's record during the flight—speaks more eloquently for the thoroughness of T-A-T training than anything we or anyone else can say.

Robbins Watched Kelly Train

Robbins is familiar with T-A-T training methods. Robbins had seen Kelly progress through the school. He knew that he was thoroughly trained. He did not hesitate to choose Kelly for the responsible post of co-pilot and mechanic. He knew that he could depend on Kelly to keep the motor in perfect shape, and to make such delicate adjustments as replacing the broken tachometer shaft while the plane soared 1500 feet in the air, as well as taking his turn at piloting the ship. All this Kelly was thoroughly prepared to do as a graduate of T-A-T. All this you, too, will be prepared to accomplish as a T-A-T graduate.

Kelly Employed by T-A-T

On May 22, 1928, Kelly took his first flight as a student at T-A-T. In February he received his Commercial Pilot's License, and was immediately employed by one of the five related T-A-T companies. He continued his training, however, and on April 29, 1929, took examination at T-A-T for the Transport Pilot's License he now holds.

In a few months Kelly earned back the cost of his training. Today he is famous and well-to-do.

Thorough Training Gets Best Jobs

Originally planned with the purpose of Training men to fill the same type of positions which Kelly held with T-A-T . . . training men whom we KNEW were thoroughly trained . . . men with whom we might entrust the precious human cargoes and mail . . . T-A-T training finds its very roots in the ground of thorough training.

Every T-A-T student is considered a prospective member of one of the five related T-A-T companies. Many of the best graduates are offered positions immediately upon graduation, just as Kelly was. Because T-A-T training is based on the needs of the future employer, it is easier for T-A-T graduates to get the preferred positions. At T-A-T Private Flying School you will get the thorough training vital to your success.

As a student at T-A-T, Kelly was a part of a great organization and in touch with its opportunities. So will you be. Your contact with commercial aviation on a large scale will give you flying EXPERIENCE as you train—one reason for Kelly's success.

Veteran Air Mail Pilots Taught Kelly

Veteran Air Mail Pilots will supervise every step of your training. Under these instructors Kelly gained his knowledge of Navigation, Meteorology and Aerodynamics. Kelly's ability to compute wing areas, wing lift, wing curve, lift and drag were of inestimable importance to Robbins in planning the flight and in practical application during the flight. You will train in the perfect flying weather that had so much to do with making the flight of Robbins and Kelly a success. You will train in the same types of ships—all new—that gave Kelly his broad flying experience.

A scene in the shops of Southern Aeromotive Service, Inc., one of the five related T-A-T companies. Here Kelly received the regular mechanical training of all T-A-T students. Here the "Fort Worth" was serviced for the world's record endurance flight after 500 hours previous operation. Here, as a student at T-A-T, you will receive the same thorough training that was responsible for Kelly's choice as co-pilot of the redoubtable Reg Robbins . . . that enabled Kelly to keep the engine in perfect condition during the entire flight!

Enroll Now in School Where Kelly Trained

Letters are pouring in, asking for information. Under no circumstances however, will there be any deviation from the rigid T-A-T policy of keeping classes small. You should write now to insure your reservation.

The coupon below will bring you our 32-page book, "FLYING THE GOLDEN TRAIL." You will find it more interesting than a novel, just as Kelly did. It may not bring you the fame and fortune that it brought to Kelly, but it will open the way to an assured and respected position that holds the greatest rewards for Youth of any industry in History. Write for "FLYING THE GOLDEN TRAIL."

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Fort Worth, Texas

Please send me, without obligation, complete details about how I can take the same courses which gave Jim Kelly his training and flying experience.

Name.....
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City.....
Age..... Occupation.....

T-A-T FLYING SCHOOL *Incorporated*

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A Greater Supply Depot for a Greater Industry

NOW, to provide the kind of service aviation demands, Universal announces their Parts and Supply Depot located at the Lambert-St. Louis Airport in the central part of the United States.

The Robertson Division of the Universal Aviation Corporation (formerly known as the Robertson Aircraft Corporation) maintains a most complete stock of all aviation supplies and approved parts in quantities and at prices that will interest manufacturers as well as individual plane owners.

Whatever your requirements may be—nuts, bolts, propellers, motors, tubings, wheels, pyralin sheeting, helmets, goggles, flying suits, anything pertaining to aviation—you can secure them at lowest prices obtainable by writing the Robertson Division, Universal Aviation Corporation. Also official Wright Whirlwind Parts and Maintenance and Repair Depot. All Whirlwind parts are ready for immediate shipment at standard factory prices. An illustrated catalog listing and describing most of the items stocked will be sent upon request.

SERVICE

Quick service to all parts of the country is assured. Satisfaction on all purchases is absolutely guaranteed. Prompt, courteous service is given a transient flier. Write Dept. W-6.

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Kobe, Japan

Air City Airways,
Air City Airport, Sturtevant, Wisc.

Nicholas-Beazley Airplane Co., Inc.,
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Soo Skyways, Inc.,
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Wyoming Airways, Inc.,
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Pacific Parachute Service,
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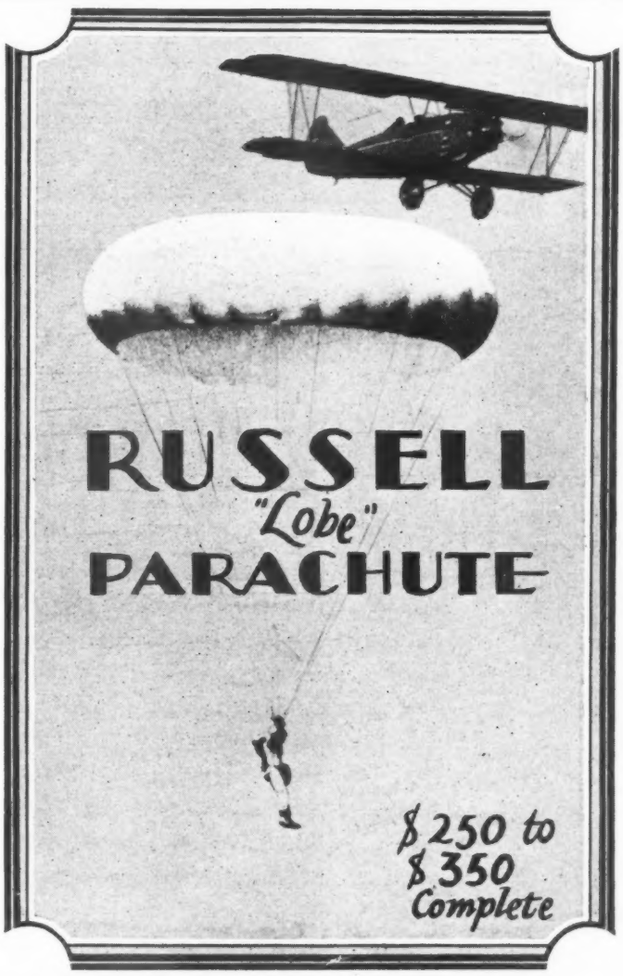

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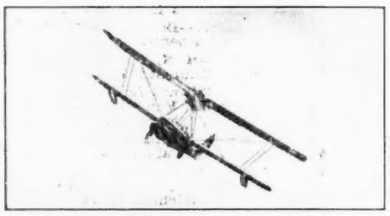
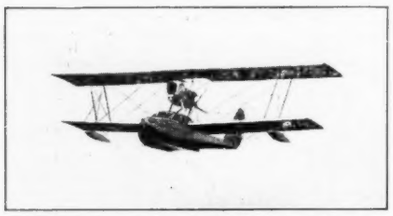


Model "S-56", 110 h. p. 3-seater dual-control Amphibian; ideally safe and versatile for personal use.



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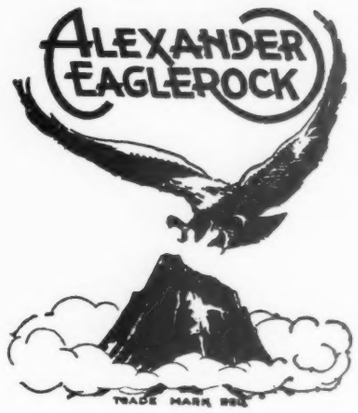

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A letter from you will get us together on this greatest opportunity for aircraft sales profits the industry has ever known.

.32 BULLET

Real speed and travel comfort for FOUR PEOPLE AND A DOG, with baggage for all. This economical low wing cabin cruiser may be powered with either the Wright J-6, 165 hp. at $8,888 or Kinner 100 hp. at $6,666.

KINNER 100 H.P.

Price **$4,157.** *Flyaway Factory.*

In visibility, ruggedness, performance, ease of handling and normal control in all positions it is close to perfection. It is a low cowling job and an ideal ship for student training as well as for students after training. It can be used in commercial work whereas most training ships are one purpose planes.

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Price **$4,000.** *Flyaway Factory.*

The standard Hisso "A" EAGLEROCK with government overhauled motor has performance at top speed comparing favorably with ships selling for twice as much. It is one of the best and most easily controlled EAGLEROCKS in the line. For advanced training, cross country work and general commercial flying, it has no equal in low first cost and economical operation.

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In actual performance the 170 hp. Challenger motored EAGLEROCK has a top speed of 130 m.p.h. It is a wonderful ship for demonstrating, sport flying and fast cross-country work.

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Popular because of its performance, smoothness and small gas consumption. Those who want flying ability and economy in the medium price class will appreciate the Wright motored EAGLEROCK.

A Ship for Every Purpose

For schools and operators in the formative stage we recommend the Kinner for student training; the Hisso "A" for advanced training and cross-country work; the Wright J-6 and Challenger for demonstrating, sport and speedy cross-country flying.

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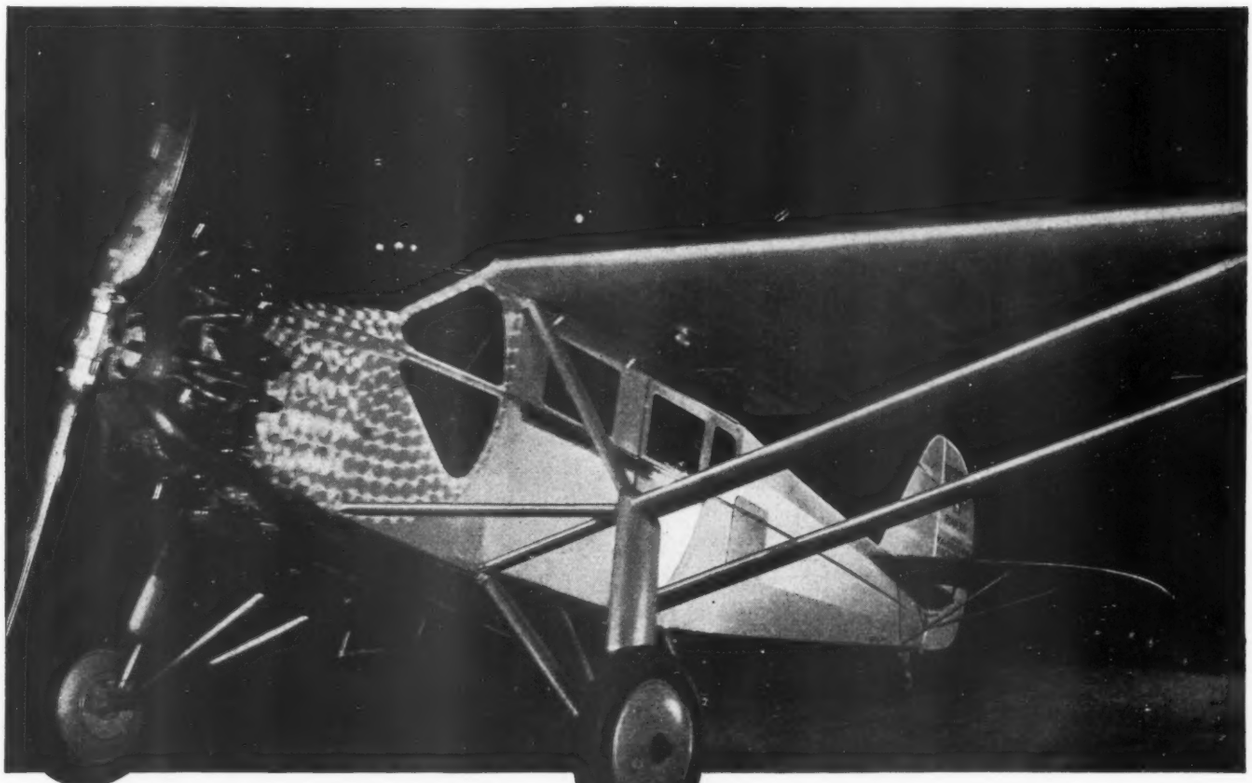

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Built for SAFETY!

You don't have to be a Lindbergh to judge the exceptional air-worthiness of the Ryan. One inspection tells you that here is no fair weather ship, but a craft engineered to withstand the unexpected stress and strain of dirty weather.

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You see it in the exclusive Ryan designed chassis with axle of Chrome Molybdenum steel tubing—the landing gear that stood up under the terrific shock of two and one-half tons weight on the take-off of the historic Paris flight. A landing carriage that will stand the gaff when you hit the dirt of the roughest fields.

You will see it, too, in the braces through the center of the Ryan's cabin. No other ship offers this safeguard to passengers and plane against the racking strain of rough landings. It adds materially to the life of the ship. And if the fabric were removed, you could see it again in the steel-tubing fuselage, master-welded at the joints and braced against torque and strain by diagonal steel members. Such *plus* construction characterizes the Ryan from spinner cap to rudder. It makes the world's most famous ship the safest, too.

Take-off with load	8 seconds, 275 ft.
Climb,	1200 ft. per min.
Top Speed,	140 m. p. h.
Cruising Speed	120 m. p. h.
Service Ceiling	18,000 ft.
Absolute Ceiling (light)	25,000 ft.
Landing Speed	50 m. p. h.
(Lands within a 200-ft. circle)	

Department of Commerce Approved Type Certificate No. 142

As to performance, the whole world knows what the Ryan can do. Here (at left) are a few details which "Red" Harrigan, at the factory, or any Ryan distributor, will gladly demonstrate.

Send for new, illustrated catalog of the new Ryan Brougham for six, powered by the Wright Whirlwind J-6 engine. Mahoney Ryan Aircraft Corporation, Lambert-St. Louis Airport, Anglum, St. Louis County, Missouri.

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Brougham For Six

SISTER SHIP OF THE "SPIRIT OF ST. LOUIS"

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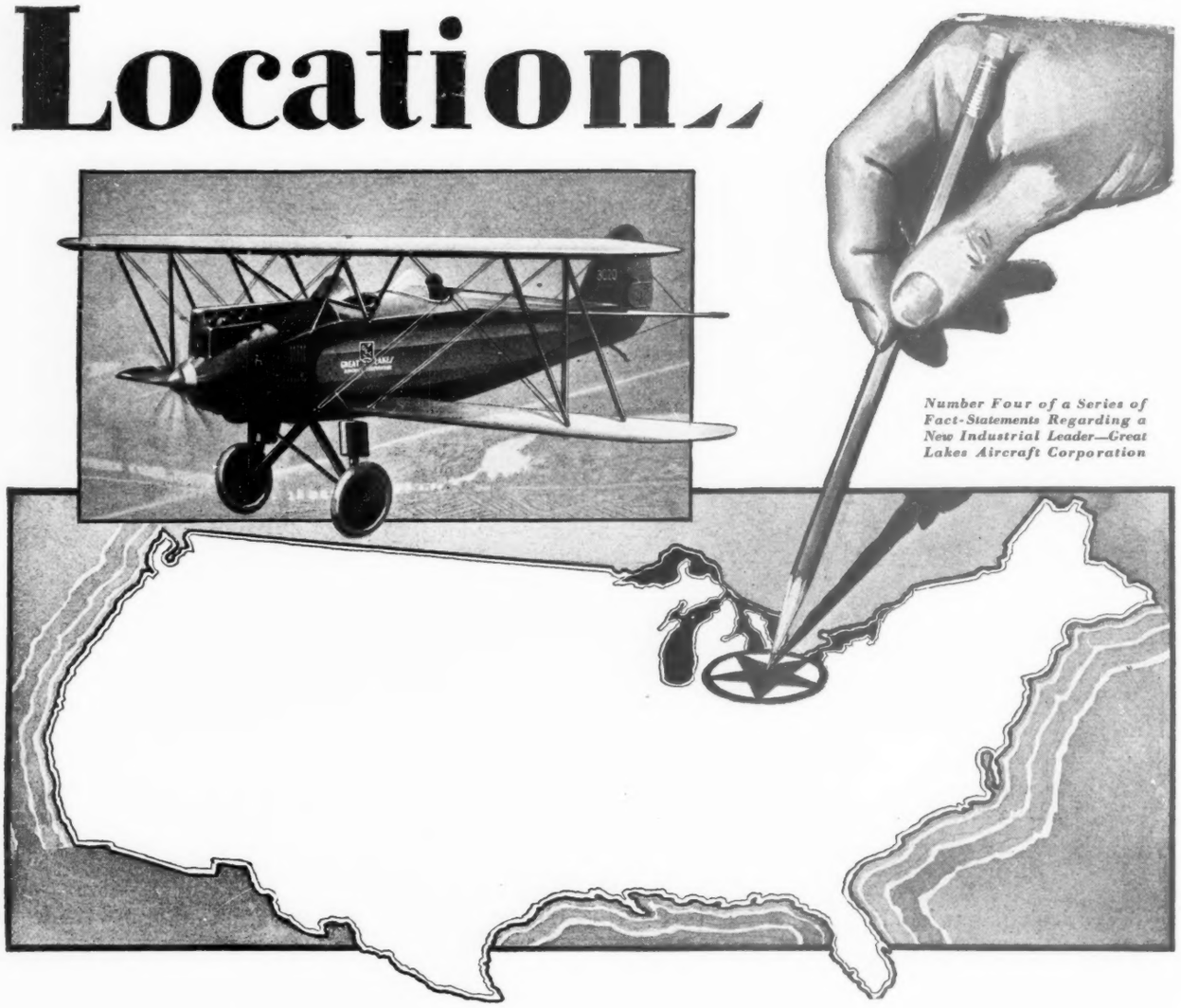

Number Four of a Series of Fact-Statements Regarding a New Industrial Leader—Great Lakes Aircraft Corporation

TO claim recognition as the "Air Capital of America" has become almost a universal habit among enterprising cities of today. Without wishing to become involved in any controversy, however, Great Lakes Aircraft Corporation is glad in its own behalf and in behalf of its customers to own Cleveland as its home.

Market-wise, we find ourselves at the hub around which revolve eighty percent of North America's commercial and sport activities. The great eastern seaboard and the rich Mississippi and Ohio Valleys are only a few hours away. Boston, New York, Philadelphia, Chicago, St. Louis, Cincinnati, and Detroit are neighbors.

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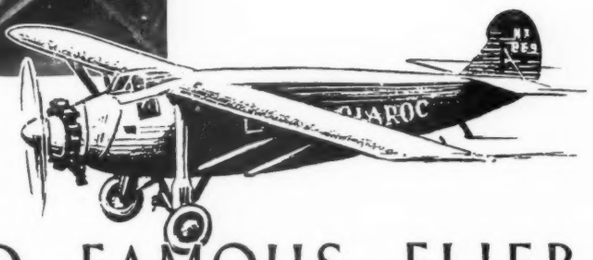

ART GOEBEL

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COLONEL Arthur C. Goebel, winner of the $25,000 James Dole race from California to Hawaii; holder of the Transcontinental Air Record from Los Angeles to New York; winner of countless other aviation events; acclaimed the greatest "stunt" flier who ever flew a ship and recognized by his fellow aviators as one of the greatest pilots in the world, has organized and is now personally teaching aviation in his own school, The Art Goebel School of Flying, in Kansas City, "The Heart and The Hub of Aviation".

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Army officers on leaves of absence are in charge of the important departments of the school. Other departments are in charge of aviators, personally selected by Colonel Goebel from the wide circle of friends he has made in his more than seven years of practical aviation. Each man is an outstanding specialist in his particular field and has been chosen for his personal qualifications to instruct as well as his practical knowledge of aviation.

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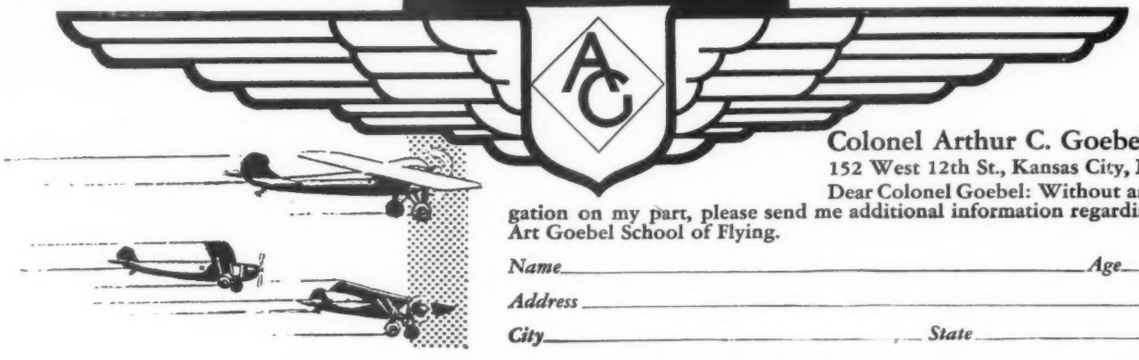

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"Nothing Flying Today Comparable to *TRAVEL AIR*"

—*says* Thomas M. Jennings

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May 20, 1929

Travel Air Company,
Wichita, Kansas.

Gentlemen:

We are enclosing your questionnaire and have answered it so as to let you know, our impressions of your planes and service.

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You may be interested to know of a recent trip made by our plane, that will give you an idea of the kind of service we are able to offer with that plane. A call came at 2:20 P. M. at San Francisco to carry a passenger from Sacramento, California, to Tulsa, Oklahoma. The plane was in the air at 2:35 and the passenger was at Tulsa, Oklahoma at 1:05 P. M. the next day. This was in no sense a stunt, but a regular commercial flight, of the type we hold ourselves ready to offer the public at any time.

We are supplying the best and fastest means of travel possible to-day and believe your equipment to be the safest and most satisfactory to use.

Very truly yours,
OVERLAND AIRWAY
By Thomas M. Jennings, Pres.

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(New Edition)

Here's Some More Food for Thought

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   March 27, 1929.
2. What is the Serial Number on your plane?
   Manufacturer's Number 969.
3. Have you always been satisfied with it?
   Very much.
4. If so, will you please name the features that appeal to you most forcibly in this plane?
   Quick take-off and climb with full load —unusual maneuver ability and stability.
5. If not, what have been your difficulties?
   None.
6. Have you any suggestions to offer?
   Not up to date.
7. Have you always received satisfactory service and shipment on parts?
   I have always received prompt service.
8. In general how are you satisfied with Travel Air Products, and would you buy another Travel Air if we had a model that would suit your requirements?
   I have owned 6 different type Travel Airs from OX open cockpit, Hisso and Whirlwind open cockpit 3-place jobs and now the 6000 cabin model. All types have successfully fulfilled their requirements. In fact, I am convinced Travel Air is second to none.
9. May we quote you in our advertisement?
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TRAVEL AIR COMPANY

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These fliers prove *Paulin System* accuracy almost to the foot ..*Depend on this accuracy!*

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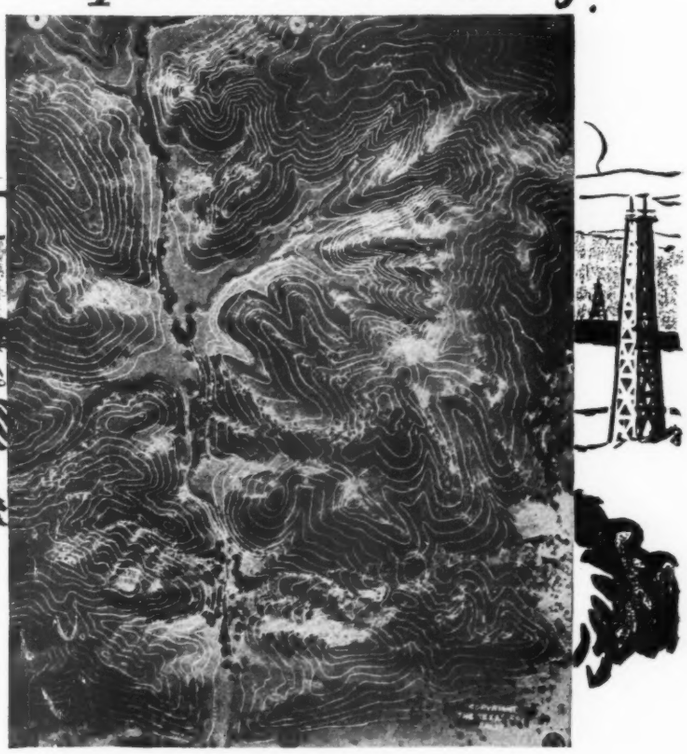

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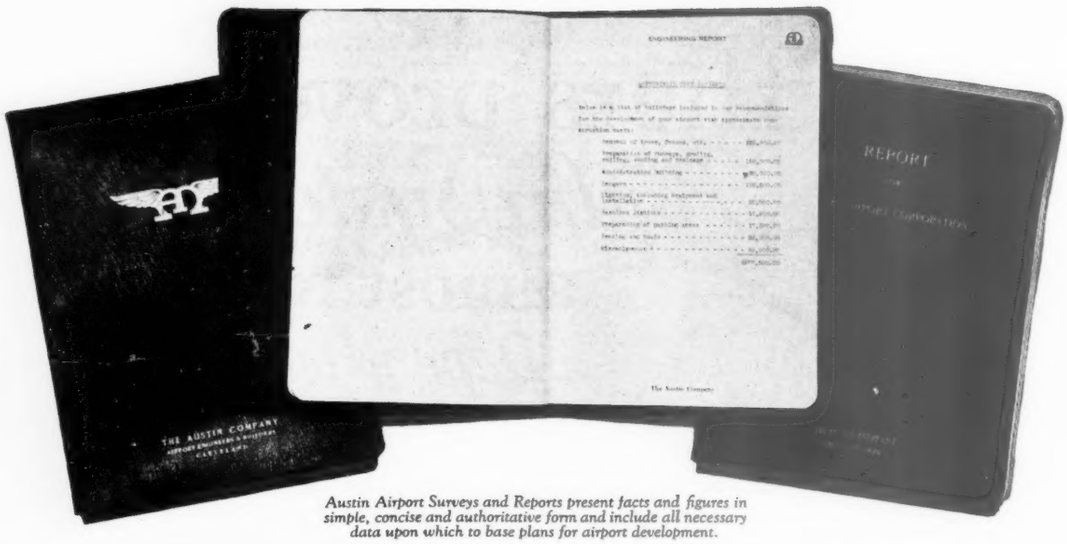

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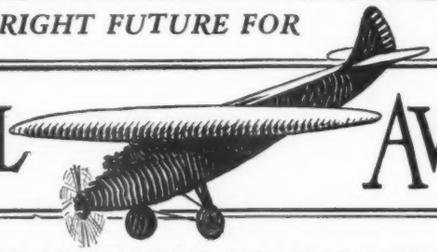

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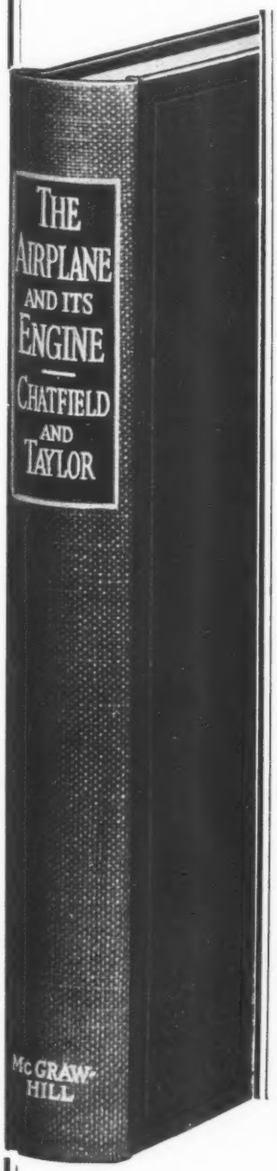

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Another Examination Shows 'Fort Worth' Motor Perfect

Valves Show Little Change, All Spark Plugs Firing; Kelly Is Praised for Faithful Care by Expert.

Despite the vibration caused by the damaged propellor, the Wright Whirlwind motor of the "Fort Worth" was in perfect condition after more than 172½ hours of continuous operation. This was revealed yesterday by a second check made by E. M. Walsh, Paterson, N. J., Wright aeronautical

"There was not a thing wrong with the motor," Walsh said. "I checked it as far as I could without taking it down."

Valves and their allied mechanism, which brought the Question Mark down, were in perfect condition, according to Walsh, who was sent by the Wright factory to get the motor in shape for the flight and to examine it after landing.

Little Valve Change.

"I set the valves with a clearance of .020 of an inch and found yesterday the clearance had increased only .027 and .030. It is customary to set valves for flight of ordinary duration .040 but to prevent excess

half of the usual clearance. I am now of the opinion that it would have taken 200 hours of flight to advance the clearance to the usual .040 inch."

Rocker arms had plenty and there were no signs of according to Walsh, who compression of each of the inders and found it sufficient.

Walsh attributed the good dition of the motor to the ess of James Kelly, co-pilot and anic of the "Fort Worth," sk of keeping it greased alt he had to endanger his life in m each trip on a "cat walk."

Two Sets of Plugs.

The Wright Whirlwind motor has a dual ignition system with two spark plugs for each cylinder fed by two magnetos. The motor will run with only one set in operation at a loss of about 20 revolutions per minute.

Both systems were working when the plane landed and all spark plugs were firing, according to Walsh. The carburetor was found to be in perfect condition. Walsh looked at the strainer on the gas line and found it clean.

During the first two days the plane

motor

oil pressure throughout the log, except ng drained. This was plane in the air by allowing to run out until the pressure dropped to near the danger point and then adding fresh oil.

off

The Wright Whirlwind Motor in the "Fort Worth," holder of the world's endurance record for all types of aircraft, was serviced by Southern Aeromotive Service, Inc., for the world-famous sustained flight, after 500 hours previous operation. The same thorough service is available for YOUR plane and motor at any of the six conveniently located S-A-S shops, to insure the same perfection and safety in your daily operations.

WITH the only shops this side of the Mississippi with exclusive Wright authorization, where the motors of the record-shattering "Fort Worth" and the refueling plane could have been put in shape for the tests they endured, S. A. S. offered every resource at their command to Robbins and Kelly. All the equipment, all the personnel of the S. A. S. shops at Fort Worth were at their disposal. All the parts needed were in stock at S. A. S. All the tubing, all the fabric required for the rebuilding of both ships was on S. A. S. shelves. All the parts and tools asked for to enable Kelly, a graduate of T-A-T Flying School, a related company, to make repairs and adjustments at 1,500 feet, were immediately available.

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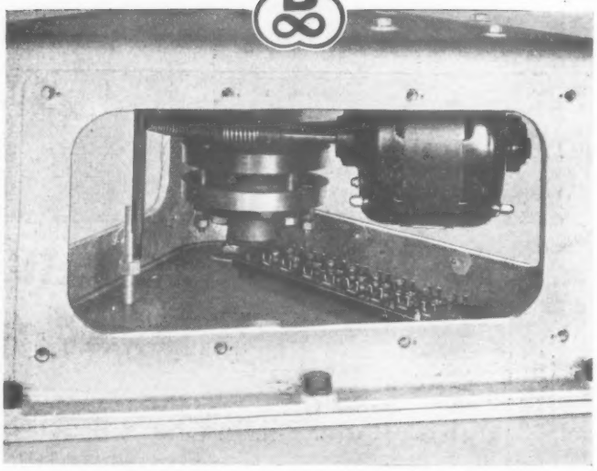

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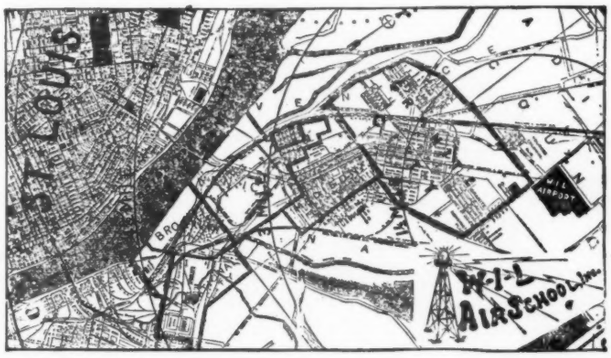

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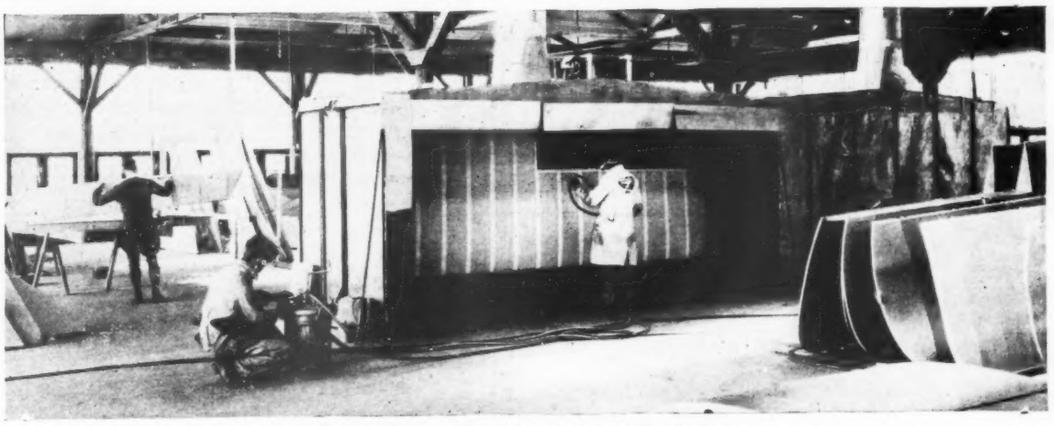

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Williamsport, Pa., Airport Opening
SATURDAY, JULY 20

EVENTS:

FRIDAY, JULY 19

ON TO WILLIAMSPORT, Cash Prizes.....$1,200.00
Cross Country Race, 1st Prize, $300.00
2nd Prize, 200.00
3rd Prize, 100.00

Free to all types and classes of planes.
The plane flying the longest distance to Williamsport, Pa., will be declared the winner.
Note: Should two or more planes travel an equal number of Air Miles the one making the fastest elapsed time will be declared the winner.
SPECIAL ELAPSED TIME PRIZE.....$250.00
A $250.00 Special Elapsed Time Prize will be awarded the plane making the fastest average miles per hour in the "On to Williamsport—Cross Country."
To the plane landing at Williamsport Airport with largest number of passengers will be awarded prize of....$50.00
To smallest plane having lowest horsepower flying to Williamsport Airport will be awarded prize of.....$200.00
To the First Aviatrix flying to Williamsport Airport will be awarded prize of $100.00

SATURDAY, JULY 20

11:00 A.M.—Free for All Race, prizes.....$850.00
(Motors under 510 cu.in. displacement.) Distance 60 miles. Entry fee $10.00. 1st Prize, $500.00, 2nd Prize, $250.00, 3rd Prize, $100.00.
2:15 P.M.—Free for All Race, prizes.....$1,500.00
(Motors under 800 cu.in. displacement.) Distance 60 miles. Entry fee $10.00. 1st Prize, $750.00, 2nd Prize, $500.00, 3rd Prize, $250.00.
Races to be run over a 15 mile 2 point course.
Air Traffic Rules of the Department of Commerce will govern the air meet in addition to the special airport regulations.

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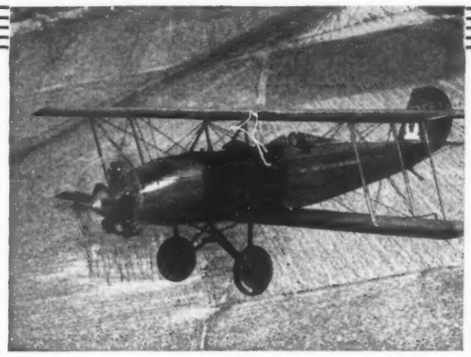

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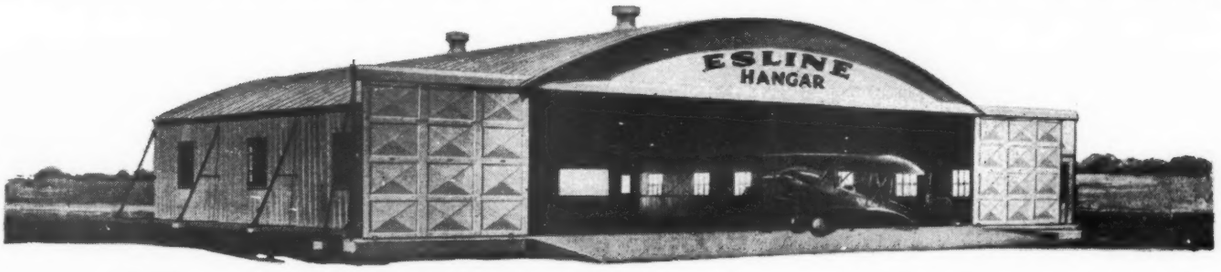

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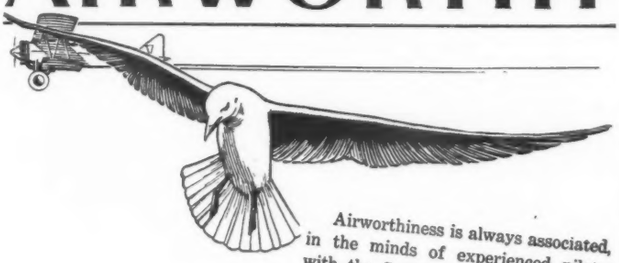

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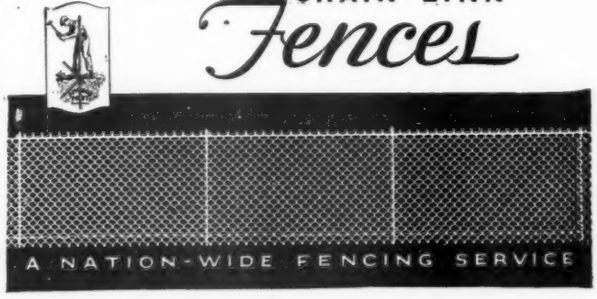

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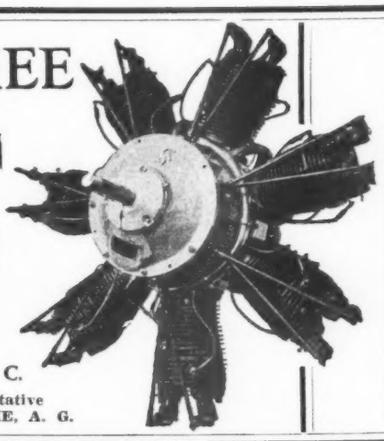

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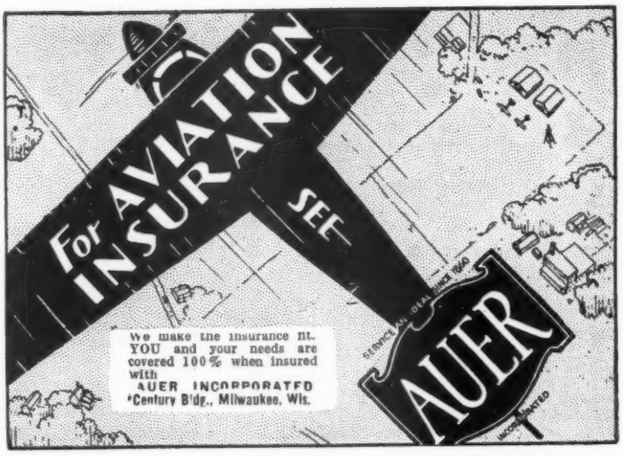
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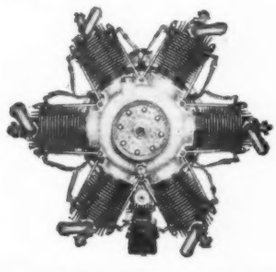

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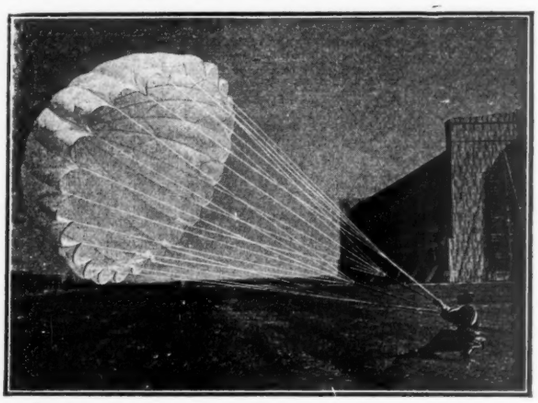

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FOR SALE, Waco 10 biplane, OX-5 motor, in perfect condition. Equipped with air speed indicator, 2 altimeters, Rieker bank and turn indicator clock, Pioneer compass, Tachometer, and temperature gauge. Ship painted bright orange striped with black, large stream-line landing wheels. Always kept in hangar and used by owner for private flying only. $2,000 cash or terms to reliable persons. W. H. Lee, 401 Atlanta National Bank Bldg., Atlanta, Ga.

FOR SALE, J-5 Stearman. New last June. Complete overhaul last November, including new recover and paint. All new Pioneer instruments, including bank and turn indicator. Sacrificing due to delivery on new ship. Just passed 100 hours. C. H. Pettersen, c/o Geo. A. Wies, Inc., Roosevelt Field No. 2, Garden City, N. Y.

FOR SALE. Ryan Broughm B-1, good condition, never crashed, Whirlwind motor, recently overhauled, lots of equipment. Reasonable for quick delivery. FS-127, Aviation, 520 No. Michigan Ave., Chicago, Ill.

FOR SALE, 1928 OX-5, licensed Waco 10, in excellent condition. Engine revs. 1,400 in blocks. 3 cylinder, 35 hp. 1928 Anzani engine, $250 complete. Complete set of Driggs Dart wings and struts cheap. Tred Avon Flying Service, Inc., Easton, Maryland.

FOR SALE, 28 hp. Lawrence, new, with propellor, hub, $90. Want radial motor, 100 horsepower or over. J. Stevens, Davis Ave., Rye, N. Y.

FOR SALE: Brand new 300 horsepower Wright motors, complete, $300. Good used ones, $200. One government overhauled 150 horsepower complete, $600. Karl Ort, York, Pa.

FOR SALE: American Eagle biplane OXX6, completely overhauled, new fabric. Also two OX5 and one OXX6 motors, completely overhauled Miller Overheads new type guides. All this equipment guaranteed. Inspection invited, terms cash. No reasonable offer refused. Edgar Tobin Aerial Surveys, 1515 Main Ave., San Antonio, Tex.

FOR SALE, OX5 clipped wing standard in good flying condition. Kept in hangar. Will sell at reasonable price. Eugene Schattel, Hermleigh, Texas.

FOR SALE: Longwing OX5, Eaglerock; dual controls; motor in A-1 condition; ready to fly away; first $1,100.00 takes it. Address John Ruzicka, Kanona, Kan.

FOR SALE: 1 OX5 Challenger, 2 months old, 35 hours. Miller valve action, special paint job, over size wheels, looks just like new (original price $3,250.00). Will sacrifice for $2,800.00. Two 'OX' motors, 100% overhaul. $400.00 each, one OX5 $500.00. One Hispano motor 150 hp., 100% overhaul $650.000. C. Descomb, 172 Grandview Terrace, Hartford, Connecticut.

FOR SALE: Converted Ford Motor, has special light crank case, Bosch Magneto, lightweight radiator. Complete with installation diagrams. $100.00. Bergholt Aircraft Co., 143 East Lake St., Minneapolis, Minn.

FOR SALE: Hisso Standard J-1, with dual controls, ready to fly away. Motor in good condition. Model A, Hisso motor. 150 H.P. For quick sale $750.00. Public Service Station, Dunn, N. C.

FOR SALE: One 60 hp. LeBlond and one 35 hp. Anzani engine. Also have number of 60 hp. Velie M-5 engines, purchased on large contract. Having now adopted 90 hp. engines as standard on our Golden Eagle airplanes, we are willing to sell these smaller engines, which are all new, at reduced prices. Golden Eagle Aircraft Corporation, 415 East Industrial Avenue, Inglewood, Calif.

FOR SALE: Travelair demonstrator, 20 hours, $2,600; Waco ten, same as new, $1,825; Eaglerock, excellent condition, $1,675. Will give ten hours instructions free to purchaser of either plane. 1359 First National Bank Bldg., Detroit, Mich. Cadillac 8892.

JENNY—Just recovered and test flown motor turns 1,450. Even wing job and ideal for instruction purposes. Also extra OX-5 practically new. $1,500 for the works. Al Leitch, 108 South 2nd Street, Ponca City, Oklahoma.

FOR SALE: One new Curtiss-Robin at a discount. Has steel propeller and dual control. A. R. Mensing, Jr., Oshkosh Airport, Oshkosh, Wis.

HESS Bluebird with 180 horse Hispano Suiza motor. Hanilton propellor, been flown 60 hours. A-1 condition. $2,500. La Salle Aircraft Corp., 111 Maple St., Joliet, Ill.

I HAVE OX-5 airplane located near New York City, want pilot with $100 capital. BO-125, Aviation, Tenth Ave. at 36th St., New York.

LICENSED OX5 Swallow for sale, 70 hours. Flown only by owner, never been damaged. George Neubauer, 913 26th St., Milwaukee, Wis.

MAGNETOS, new OXX-6 Simms, $25; new OX-5 Berlings, $50; new Dixie, model 83 and 85, $40; used Dixie, model 800, $35. Karl Ort, York, Pa.

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Wright J-5 engine. Total time 150 hrs. This ship has been privately owned and flown. It is in perfect condition and represents a real bargain. Equipment includes Bank and Turn, Air Speed, Pitch and Climb Indicators; compass, clock and Hamilton Prop. This ship is offered for an unusually low price. Free delivery within 500 miles. For further particulars and photographs apply to

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Siemens Halske SH 12
9 cylinders, 125 H.P.

1928 with 105 hours; fuselage recovered this Spring, finished Berryloid Alexander blue; Diana cream varnished wings and wheels; Bendix wheels and brakes; Hamilton metal propeller; baggage compartment; special all Pioneer instrument board including ignition switch with key, Waltham clock, oil pressure gauge, oil temperature gauge, tachometer, air speed indicator, altimeter, instrument board lights with rheostat control, navigation lights, compass, bank and turn indicator, and rate-of-climb indicator; booster magneto; adjustabale pilot seat; complete set of Siemens Halske tools as supplied by the factory. Motor has just had complete overhaul by factory service man and is in perfect condition. Privately owned and not used for instruction. Less than 200 landings. Always kept in hangar. Owner selling to purchase Amphibian. Cost new over $7,000, price now $4,850.

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3 AIRPLANES FOR SALE

Eaglerock Warner Motor job perfect condition, compass clock, extra altimeter, D. H. wheels, has never been used commercially. Eaglerock Combination wing OX5 motor new June, 1928, will sell less motor, $1,425.
Travelair OX5 motor, just received, top overhaul. This ship like new, $2,500.

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4278 West Fort Street, Detroit, Mich.

FOR SALE

NEW original crate Hammondsport OX-5, $850; 220 hp. Hisso, less magnetos, $225; 180 hp., Hisso, just overhauled and block tested, $850. Karl Ort, York, Pa.

OX5 Standard, completely rebuilt and recovered, same as new, dual control, D.H. landing gear, two hours' time since reconditioning. $900 complete, $500 less motor. C. R. Muhlberger, Hamilton, Ohio.

OX5 WACO out thirteen months, for sale, exchange for real estate. Terms to responsible party. Consider other trades as part payment. R. D. Troutman, Box 67, Ethel, Mo.

ONE new Crawford monoplane for sale, two place, steel tube job, less motor tail surfaces and control system, $250. Will perform on 60 hp. $150 factory made parts completes ship. Paul Bradford, Vienna, Va.

RYAN B-1 Cabin job for sale; 4 passengers and pilot, with J5C motor; 20 hours since complete overhaul brakes and standard steel propeller, $5,500, for quick sale; $3,500 without motor; fully equipped, ready to fly away. M. A. Caffarello, 460 North Halsted St., Chicago, Ill.

SLIGHTLY used two upper and one right lower wing for American Eagle Biplane, $90 each; also new Chrome Molly OX-5, Fuselage and monoplane wing, $150 for fuselage, and $100 for wing. Revelation Aircraft Co., 225 W. 57th Street, New York City.

STINSON Detroiter Monoplane: Six place, never crashed, 60 hours since factory motor overhaul, three hours since complete ship overhaul Stinson factory which included recovering wings, fuselage, tail surfaces, painting blue and gold, upholstering cabin, new control cables and pulleys throughout, new motor cowling. Spare standard steel propeller. Priced for quick sale at $7,500. Pal-Waukee Airport, Inc., Mt. Prospect, Illinois.

STINSON Junior four place cabin monoplane for sale, practically new and powered with a 110 Warner-Scarab engine. Less than 50 hours. Thompson Aeronautical Corp., 2011 Union Trust Building, Cleveland, Ohio.

STINSON Detroiter Biplane, J-4 Wright 200 hp. Earth inductor compass and instruments complete. Never crashed and always stored in hangar. $3,500 for quick sale. Box 383, Dearborn, Mich.

TRAVELAIR OX-5, 70 hours, DH wheels, Pioneer compass, never crashed, always kept in hangar, looks like new, purchased last September, $2,400. Captain L. G. Mulzer, Wisconsin Rapids, Wisconsin.

WACO "TEN," approximately 75 hours. This motor brand-new when originally purchased and turned 1400 on ground. Dual controls, compass, Hamilton prop., etc., and looks like new. Completely licensed. Privately used and always under cover. Price $2,400. For information phone or write E. Roth, Syracuse Airport, Syracuse, N. Y. Phone Prospect 407.

1929 Waco 10; OX5. First offer takes it. Room 510, 1060 Broad St., Newark, N. J. Mitchell 5757.

WACO 10, excellent condition, OX5 motor, revs. 1400 Flyaway. $2,000. Norman Sturrock, 75 Edwin St., Quincy, Mass. Tel. Granite 2245-W.

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Ship like new. Only 70 hours. Motor 35 hours. Bendix Brakes, Pioneer compass, other extra equipment. Ship never cracked. Reason for sale owner buying larger ship. Will accept any reasonable cash offer. Wire or write

B. D. COWAN
Cedar Rapids, Iowa

FOR SALE

WARNER Scarab Waco; bought new last November; only fifty hours; equipment, special color scheme, Bendix wheels and brakes, center section tank, luggage carrier, Standard steel propeller, Star compass, Pioneer air speed, bank turn and climb; owner selling at sacrifice to buy larger ship. $4,300 cash takes it. Pal-Waukee Airport, Mt. Prospect, Illinois.

WHAT kind of ship have you to trade for 1929 Victoria four passenger Hudson coupe, like new, 4,500 miles. Delivered for $1,685, April third. FS-133, Aviation, 520 No. Michigan Ave., Chicago, Ill.

EQUIPMENT WANTED

WANTED: Lower wing and under carriage for right side, also center section struts for OX5 Travel Air. W-141, Aviation, Tenth Ave. at 36th St., New Yok.

I BUY OX-5 motors in any condition and will trade or exchange aeronautical motors of all descriptions. Karl Ort, York, Pa.

POSITIONS VACANT

ESTABLISHED Eastern company wants layout draftsmen, project engineers, stress analysis men, and men familiar with weight control. Only men with airplane experience need apply. Give full particulars as to experience and salary. P-97, Aviation, Tenth Ave. at 36th St., New York.

LICENSED airplane and engine mechanic wanted. Must be capable of rebuilding; experienced welder, etc. Salary $2,600 yearly to start. Write giving experience and qualifications. Westchester Airport Corporation, 122 East 42nd Street, New York City.

WANTED aeronautical designers, draftsmen and shop men, must be experienced, call in person or write fully. The Verville Aircraft Company, 7424 Melville Avenue, Detroit, Michigan.

YOUNG man wanted, with parachute for exhibition work. One interested in taking flying time preferred. Steady connection. Box 179, Hamilton, Ohio.

POSITIONS WANTED

BOY, 17, wishes employment with some reliable aircraft firm to obtain either mechanic's or pilot's license. Will consider any offer. PW-98, Aviation, 520 No. Michigan Ave., Chicago, Ill.

L.C. PILOT wishes connection with party with ship; 100 hours on different makes of ships, good references. Salary and place no object. Cross-country experiences. R. J. Scott, Madelia, Minnesota.

LICENSED pilot, 100 hours, mostly cross country, owns licensed Mercury ship with C-6 motor, just completely overhauled, wants any kind of position. What offers? Merrill F. McHenry, Hornell, N. Y.

TRANSPORT pilot with ship wishes position with or without his ship. Licensed mechanic. PW-123, Aviation, 883 Mission St., San Francisco, Calif.

TRANSPORT pilot, 600 certified hours. Would like to make connections with company operating mail or passenger lines, or individual owning cabin job. References on request. T. E. White, 311 S. Fuller St., Independence, Mo.

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MACHINE shop service on OX-5's. Cylinders reground, new pistons, pins and rings. Graphite guides and inserted seats installed. Oversize pins installed in valve actions. Main and connecting rod bearings line reamed. All work guaranteed. New OX-5 parts. Write for complete circular. Heckman Machine Works, 4026 West Lake St. Chicago, Ill.

PROSPECTIVE route for running air service. No ground communications. Monopoly, mail contract chance. Advertiser wants co-operation manufacturer, financier; respectable references. M-130, Aviation, Tenth Ave. at 36th St., New York.

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Name of Airplane	*Type*	*Open or Cabin*	*No. of Persons*	*Ship No.*	*Motor No. of Hours*	*Ship Time*	*Price as is F.O.B. Location*	
Monocoupe	Mono.	Cabin	2	C6923	40 hr. Velie	35 hr.	$1,500	St. Louis
Monocoupe	Mono.	Cabin	2	C6538	60 hr. Velie	55 hr.	$1,500	Minneapolis
Curtiss-Robin	Mono.	Cabin	3	C7497	31 hr. OX-5	37 hr.	$3,400	Minneapolis
Curtiss-Robin	Mono.	Cabin	3	C7507	21 hr. OX-5	70 hr.	$3,500	Minneapolis
Waco 10	Bi.	Open	3	C6939	New OX-5	New	$2,500	St. Louis
Standard J-I	Bi.	Open	2	.....	Overhauled OX-5	New	$1,500	St. Louis
Ryan	Mono.	Cabin	5	C958	30 hr. W. W. J5	400 hr.	$4,800	St. Louis
International	Bi.	Cabin	6	C3266	90 hr. W. W. J5	90 hr.	$4,500	St. Louis
Lockheed Vega	Mono.	Cabin	6	NC7953	125 hr. Wasp	120 hr.	$17,500	St. Louis
Ryan	Mono.	Cabin	5	C3423	50 hr. W. W. J5	250 hr.	$6,500	St. Louis
Cessna	Mono.	Cabin	4	NC6442	126 hr. W. W. J5	111 hr.	$7,000	St. Louis
Fairchild	Mono.	Cabin	5	C4441	80 hr. W. W. J5	75 hr.	$7,000	St. Louis
Curtiss-Robin	Mono.	Cabin	3	C124E	20 hr. OX-5	18 hr.	$3,400	St. Louis
Ryan	Mono.	Cabin	5	C4654	125 hr. W. W. J5	275 hr.	$5,000	Oklahoma City
Ryan	Mono.	Cabin	5	C1787	Reblt. W. W. J5	500 hr.	$5,500	Oklahoma City
Lockheed Vega	Mono.	Cabin	5	C7426	Reblt. W. W. J5	250 hr.	$8,000	Minneapolis

Department W-6

UNIVERSAL AVIATION CORPORATION

Robertson Division

USED PLANE DEPT.

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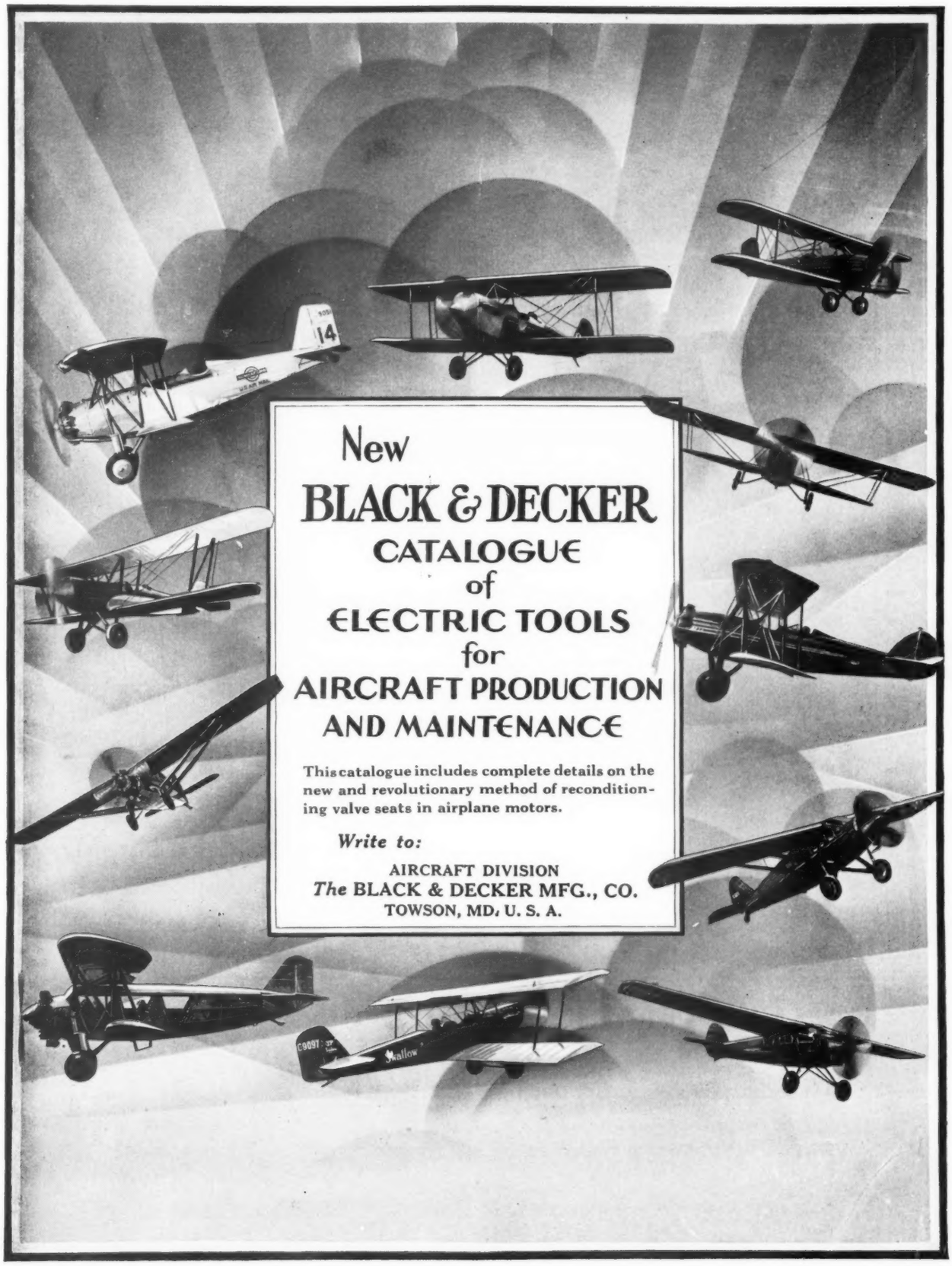
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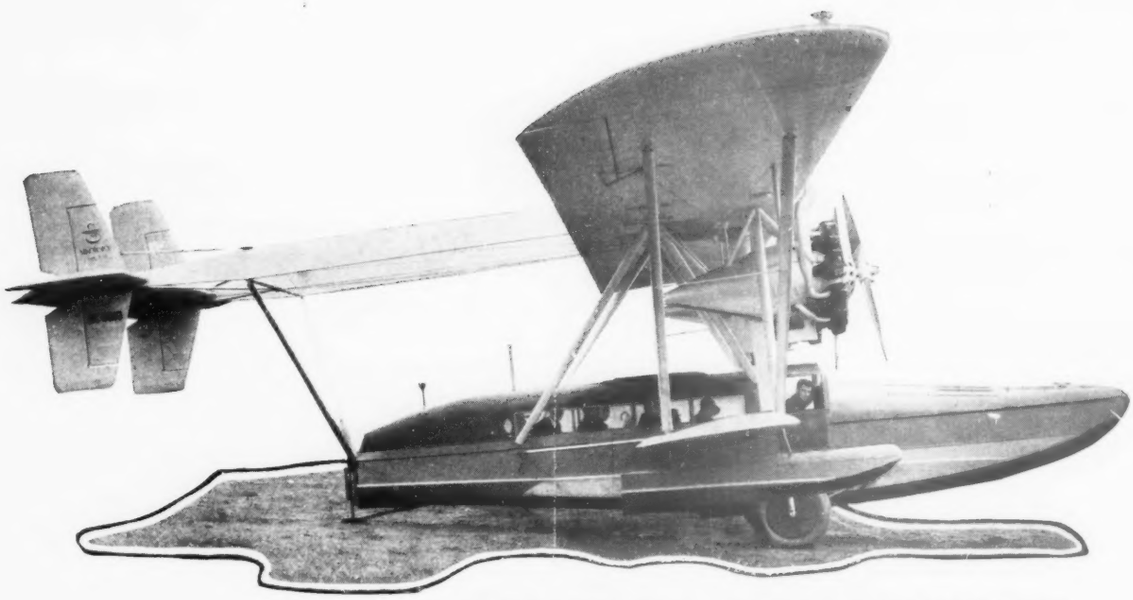

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